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**Morpho-phonological and Morpho-thematic Relations
in Hebrew and Arabic Verb Formation**

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Abstract

This study investigates verb formation in Modern Hebrew (hereafter MH) and Palestinian Arabic (hereafter PA). It examines the interaction between morpho-phonology and thematic operations. I refer to this interaction as *morpho-thematic relations*. It is widely accepted that distinct thematic realizations of the same verbal concept are related items. I assume that they are derived from one another via valence-changing operations that manipulate the argument structure of a predicate. In both MH and PA, these thematic operations usually result in at least two predicates that share the same concept but are morphologically distinct (e.g. PA *bana* ‘build’ and its passive counterpart *inbana* ‘be built’).

In Semitic languages such as MH and PA, thematically related verbs share the same stem consonants and are represented in different configurations, called *binyanim* in Hebrew (sg. *binyan*). The choice of binyan for a given verb is to some extent predictable, but there is also a great deal of variation and idiosyncrasy in the system. Previous studies have addressed various aspects of the relationship between form and meaning in the verbal systems of MH and of various dialects of Arabic. Most previous studies examined either the syntactic-semantic aspect or the morpho-phonology of the binyanim, but there are fewer studies taking both aspects together into consideration (see for example Bolozky 1978, 1999 and Schwarzwald 2008). The present study explores the morpho-phonological and thematic factors that play a role in binyan selection, aiming at revealing their interaction in different domains. I address this issue by considering several empirical arrays: verb innovation, relationships between existing forms, language variation and change, and blocking effects in verb formation.

I advance three main claims.

- (i) There is a constant interaction between morpho-phonological constraints and thematic-semantic criteria. The interaction between the two plays a crucial role in all aspects of verb formation.
- (ii) Following the claim that valence changing can apply in the lexicon and in the syntax, I contend that the component of the grammar in which thematic operations

take place, affects the relation between morpho-phonology and valence changing. I show that there are characteristic distinctions between the effect of morpho-phonology in the lexicon and its effect in the syntax.

(iii) A word-based account provides a better account for the application of morpho-phonological constraints on valence changing and for distinctions between the two types of morpho-phonology (mentioned in (ii)). Specifically for MH and PA, this type of account makes no separate reference to a consonantal root, as words are assumed to be formed directly from existing words via stem-internal modifications

The dissertation is organized as follows. Chapter 2 presents the general framework of the research, in particular, the hypothesis that the lexicon is an active component of the grammar. I discuss the basic assumptions that such an approach makes with regard to morphology, phonological representation, and the application of valence-changing operations.

Chapter 3 examines the **division of labor between the lexicon and the syntax** with respect to thematic operations, and discusses the implications of this division for morpho-phonology. The next four chapters examine the relationship between morpho-phonology and thematic operations in four different empirical arrays.

Chapter 4 deals with **verb innovation**; it investigates the criteria for binyan selection in the formation of new verbs. Verb innovation provides direct access to the process of verb formation and shows how different types of criteria and constraints are taken into consideration. It is shown that the interaction of thematic-semantic and morpho-phonological criteria dictates the selection of binyan.

Chapter 5 examines **the relation between exiting forms** with respect to valence changing. I show that while there are specific binyan paradigms for each operation, there are also cases where the selection of binyan seems to be less predictable. In addition, there are phonological faithfulness constraints that dictate the selection of a specific binyan.

Chapter 6 addresses the issue of **morphological variation**, in which a specific verbal concept becomes associated with an additional binyan, without change of meaning, resulting in two verbs that are morphologically related and semantically identical. The main claim is that the development of another binyan results from both morpho-phonological and thematic-syntactic factors. With respect to the former, the morphological mechanism changes the binyan of verbs in cases where their inflectional paradigm consists of prosodic or consonant alternation. With respect to the latter, verbs that are stored in the lexicon as thematically derived entries have a greater chance of undergoing binyan change than do basic entries. In addition, verbs which are morphologically neutral with respect to transitivity change into a binyan that is marked as transitive or intransitive.

Chapter 7 provides an analysis of **blocking effects** in verb formation. I present four cases in which verbs that are conceptually possible do not occur as actual words arguing that their absence is not a mere coincidence. Rather, it is the result of phonological constraints that block verb formation. Furthermore, I show that the same factors that block word formation in the lexicon do not block it in the syntax. This provides further evidence that there are two types of morphological processes.

Chapter 8 consists of concluding remarks.

This study provides insights into the organization of the mental lexicon and its interaction with the morphological module of the grammar and into the forces that play a role in word formation.

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Chapter 1. Introduction

1.1. Goals of the Study

This study investigates verb formation in Modern Hebrew (hereafter MH) and Palestinian Arabic (hereafter PA). It examines the interaction between morpho-phonology and the thematic operations. I refer to this interaction as *morpho-thematic relations*.

It is widely accepted that distinct thematic realizations of the same verbal concept are related items. Following Reinhart and Siloni (2005), I assume that they are derived from one another via valence-changing (thematic) operations that manipulate the argument structure of a predicate. In both MH and PA, these thematic operations usually result in at least two predicates that share the same concept but are morphologically distinct (e.g. MH *katav* ‘write’ and its reciprocal counterpart *hitkatev* ‘correspond’). In other words, valence-changing operations in these languages are marked by morphological processes.

In Semitic languages such as MH and PA, thematically related verbs share the same stem consonants and are represented in different configurations, each with a distinct vocalic pattern, called *binyanim* (sg. *binyan*). The binyan determines the phonological shape of the verb: its vowels, prosodic structure and affixes (if any). The phonological shape of a verb (unlike that of a noun) is essential for determining the shape of other forms in the inflectional paradigm (Schwarzwald 1973, Bolozky 1978, Bat-El 1989, 2011, Aronoff 1994a).

The choice of binyan for a given verb is to some extent predictable, but there is also a great deal of variation and idiosyncrasy in the system. Previous studies have addressed various aspects of the relationship between form and meaning in the verbal systems of MH (Ornan 1971, Blau 1972, Ben-Asher 1972, Bar-Adon 1978, Berman 1975a, 1975b, 1978, Schwarzwald 1975, 1981a, Bolozky 1978, 1982, 1999, 2003a, Goldenberg 1985, 1994, Ravid 1990, 2003, Nir 1993, Bat-El 1994, Henkin 1997, Ussishkin 1999a, 2005, Sasasaki 2000a, 2000b, Borochofsky 2001, Ravid and

Malenky 2001, Doron 2003a, 2008, Nevins 2005, Siloni 2008a, Izre'el 2010, among many others) and of various dialects of Arabic (Blanc 1970, Saad 1982, Bolozky and Saad 1983, Saad and Bolozky 1984, Testen 1987, DeMiller 1988, Moore 1990, Wittig 1990, Benmamoun 1991, Mahmoud 1991, Levin 1995, Chekayri and Scheer 1996, Guerssel and Lowenstamm 1996, Al-Dobaian 1998, 2005, Holes 1998, 2004, Younes 2000, Watson 2002, Teeple 2003, Jastrow 2004, Hallman 2006, Shawarbah 2007, Henkin 2010, among others). The present study explores the morpho-phonological and thematic factors that play a role in binyan selection, aiming at revealing their interaction in different domains. I address this issue by considering several empirical arrays: verb innovation, relationships between existing forms, language variation and change, and blocking effects on verb formation.

I advance three main claims. First, I argue that there is a constant interaction between morpho-phonological constraints and thematic-syntactic criteria. The interaction between the two plays a crucial role in all aspects of verb formation; it reflects propensities of the word-formation mechanism with respect to binyan selection, development of new forms of verbs, and the blocking of verb formation.

Second, I contend that the operations can take place in the the lexicon or in the the syntax, and component of the grammar in which they take place affects the relation between morpho-phonology and valence changing. I show that there are characteristic distinctions between the effect of morpho-phonology in the lexicon and its effect in the syntax. These distinctions provide evidence for the existence of two types of morphology – lexical and syntactic – and support the claim that morphology is an independent component of the grammar which interacts separately with the lexicon and the syntax. Furthermore, it supports the notion of the lexicon as a component of the grammar that is active in word formation, in addition to the syntax.

Third, I argue in favor of a word-based account, in which words are formed directly from existing words via stem-internal modifications. Specifically for languages such as MH and PA, this type of account makes no separate reference to a consonantal root, which does not exist independently. I argue that this approach

provides a better account for the application of morpho-phonological constraints on valence changing and for distinctions between the two types of morpho-phonology.

This study provides insights into the organization of the mental lexicon and its interaction with the morphological module of the grammar and into the forces that play a role in word formation.

1.2. Outline

The dissertation is organized as follows. Chapter 2 presents the general framework of the research, in particular, the hypothesis that the lexicon is an active component of the grammar. I discuss the basic assumptions that such an approach makes with regard to morphology, phonological representation, and the application of valence-changing operations.

Chapter 3 examines the **division of labor between the lexicon and the syntax** with respect to thematic operations, and discusses the implications of this division for morpho-phonology. The next four chapters examine the relationship between morpho-phonology and thematic operations in four different empirical arrays.

Chapter 4 deals with **verb innovation**; specifically, it considers the criteria for binyan selection in the formation of new verbs. Verb innovation provides direct access to the process of verb formation and shows how different types of criteria and constraints are taken into consideration. I show that in both MH and PA, the interaction of thematic-semantic and morpho-phonological criteria dictates the selection of binyan.

Chapter 5 examines **the relation between exiting forms** with respect to valence changing. I present the morphological manifestation of five operations, showing that while there are specific binyan paradigms for each operation, there are also cases where the selection of binyan seems to be arbitrary and less predictable. I show that even in such cases, there are phonological faithfulness constraints that dictate the selection of a specific binyan and not another. Furthermore, this chapter provides an account for cases of an apparent mismatch between thematic and morphological

relations between verbs. These are cases where the thematic properties of the verb indicate that form A is derived from B, while the morphological relation between them shows that A is the base for the formation of B. To resolve such mismatches, I propose a systematic guideline, which takes into consideration diachronic data regarding the emergence of verbs, relying on the notion of frozen lexical entry.

Chapter 6 addresses the issue of **morphological variation**, in which a specific verbal concept becomes associated with an additional binyan, without change of meaning, resulting in two (or sometimes three) verbs that are morphologically related and semantically identical. After defining morphological variation as it relates to the binyan system and outlining three different types of variation, I analyze the factors that bring about the development of a new morphological form alongside the existing form, and are responsible for the choice of a specific binyan during that process. The main claim is that the addition of another binyan results from both morphophonological and thematic-syntactic factors. With respect to the former, the morphological mechanism changes the binyan of verbs in cases where their inflectional paradigm consists of prosodic or segmental alternation. With respect to the latter, verbs that are stored in the lexicon as thematically derived entries have a greater chance of undergoing binyan change than do basic entries. Verbs that are the output of syntactic operations do not undergo morphological change. In addition, verbs which are morphologically neutral with respect to transitivity change into a binyan that is marked as transitive or intransitive.

Chapter 7 provides an analysis of **blocking effects** on verb formation. I present four cases in which verbs that are conceptually possible do not occur as actual words arguing that their absence is not a mere coincidence. It is, rather, the result of phonological constraints such as the Obligatory Contour Principle and morphological complexity that results from inactive morphological patterns. Furthermore, I show that the same factors that block word formation in the lexicon do not block it in the syntax. This provides further evidence that there are two types of morphological processes,

those that apply to lexical outputs in the lexicon and those that apply to syntactic outputs in the syntax.

Chapter 8 consists of concluding remarks.

Chapter 2. Theoretical Background: The Active Lexicon

This chapter presents the theoretical framework which my research is anchored in. The work reported here is based on the notion of an active lexicon (as coined by Siloni 2002), that stems from the lexicalist approach to word-formation (Chomsky 1970, Halle 1973).¹ The active lexicon has thus far been discussed in the literature from two separate points of view: a morpho-phonological one and a syntactic-thematic one. The former contends that morphological rules can apply in the lexicon, and the latter argues that valence changing operations can apply in the lexicon. According to the lexicalist approach, words are formed by lexical rules which are independent of and different from the syntactic rules of the syntax. The concept of an active lexicon states that the lexicon is active in word formation and is thus more than just a list of items. The approach follows Jackendoff's (1975) full-entry theory, according to which the lexicon is a repository of information about existing words. This work supports the concept of a lexicon that is active in both of these modules and that participates in the application of valence-changing thematic operations and in morpho-phonological processes. These two different notions of the active lexicon will be discussed in detail below. In addition, this work supports the claim that morphology is an independent component of the grammar that interacts separately with the lexicon and the syntax (Borer 1991).

2.1. Morpho-phonological Relations and the Lexicon

The idea of a morpho-phonologically active lexicon is based on the claim that morpho-phonology can apply within the lexicon (Aronoff 1976, 1994a, 2007, Steriade 1988, McCarthy and Prince 1990, Bat-El 1994, 2001, Ussishkin 1999a, 2005, Blevins 2005, 2006, among others). As will be discussed below, the relevant arguments rely on a word-based approach and on the assumption that words are organized in paradigms.

¹ The lexicalist approach has received different formulations over the years. See for example, Lapointe (1980), Selkirk (1982), DiSciullo and Williams (1987), Bresnan and Mchombo (1995) among others. The differences between them are not crucial for the purposes of this study.

2.1.1. Word Based Derivation and the Accessibility of Paradigms

The word-based approach, originally proposed in Aronoff (1976), is the notion that the lexicon consists of words rather than of morphemes, roots or coded concepts. Aronoff's main thesis states that a word is formed by applying Word Formation Rules (WFRs) to an existing word or stem. Both the derived and the base words are members of a major lexical category. Aronoff refers to these rules as once-only rules that do not apply every time a native speaker speaks. They serve for producing and understanding new words which may be added to the speaker's lexicon and as redundancy rules defining morphological relations. Such a view assumes a phonological representation of words in the lexicon. The distinction between a root/morpheme-based morphology and a word-based morphology corresponds to the traditional distinction between 'item and arrangement' model and 'item and process' models respectively (Hockett 1954, Matthews 1972, 1974, Anderson 1992). The former is a model in which morphemes are the basic units of meaning and they are arranged linearly. The latter is a model in which the structure of a word is specified by a series of processes affecting its base. This study advocates the advantages of the latter model. This view also intertwines with the framework of Lexical Phonology (Kiparsky 1982, Mohanan 1986, Goldsmith 1993), in which phonology and morphology serve as inputs for one another. The core of lexical phonology is that a subset of phonological rule applies in the lexicon in accordance with morphological operations, and another subset applies post-lexically. The output of a phonological process can undergo morphological processes and be subject to further phonological rules.

Another crucial aspect of the idea of a morpho-phonologically active lexicon is access to an entire paradigm during the course of derivation (Steriade 2000, McCarthy 2005). A paradigm expresses the ways in which linguistic entities may be connected in the lexicon. As a result of these connections, there are various cases where a phonologically motivated alternation is suppressed in favor of paradigm uniformity. Thus, relationships between existing words are taken into account during the

formation of new words. This study provides further support for the claim that the mechanism of word formation must take into account not only the word itself but also its relationships to other words in a paradigm (see Van Marle 1985, Spencer 1988, Corbin 1989, Stump 1991, 2001, Anderson 1992, Bochner 1993, Booij 1996, Steriade 2000 and McCarthy 2005, Blevins 2005, 2006 among others).

2.1.2. Non-concatenative Semitic Morphology

Semitic morphology raises questions about the exact processes that take place in word formation. I adopt the theory of Stem Modification (Steriade 1988, McCarthy and Prince 1990, Bat-El 1994), which accounts for generalizations about morpho-phonological alternations by allowing for stem-internal adjustments rather than positing the extraction of a consonantal root (Ornan 1983, Bat-El 1986, McCarthy 1979, 1981, McCarthy and Prince 1986, Yip 1988a, Hoberman 1988, 1992, Farwaneh 1990). This theory accounts for the transfer of information such as vowel quality, consonant adjacency and prosodic structure from a base form to a derived form. It also supplies a uniform account for cases of non-Semitic languages exhibiting phenomena similar to those found in Semitic languages (Bat-El 2002). In addition, Guerssel and Lowenstamm's (1990, 1996) analysis of Classical Arabic verbs suggests that the vowel in an inflectionally derived stem can be predicted on the basis of the quality of the lexically specified vowel in the base. Various studies have highlighted the absence of motivation for a root-based derivation (Bolzky 1978, 1999, 2003a, 2005, Horvath 1981, Lederman 1982, Heath 1987, Hammond 1988, McCarthy and Prince 1990, Bat-El 1994, 2001, 2002, Ratcliffe 1997, 1998, Gafos 2001, Rose 1998, Ussishkin 1999a, 2003, 2005, Benmamoun 2000, 2003).). The current study adds to earlier studies by providing further evidence that the word-based approach allows a better account than the root-based approach with regard the relationships between the various verbal forms in MH and PA. There are, in addition, studies that examine the question of root-based or word-based storage in Semitic languages from a psycholinguistic experimental point of view (see for example Frost, Forster, and Deutsch 1997,

Boudelaa and Marslen-Wilson 2000, 2004, Frost, Deutsch, and Forster 2000, Sumner 2003, Berent, Vaknin, and Marcus 2006, Twist 2006 and Ussishkin and LaCross 2008). The proposals made in this study would allow designing various other psycholinguistic experiments that would test the hypotheses advanced.

2.2. Thematic Relations in the Lexicon

Studies defending the active lexicon approach with regard to thematic relations claim that valence changing can apply in the lexicon. In this framework, the grammar includes a lexicon that is more than merely a list of items, and allows for the application of derivational operations regardless of the morphological change that takes place, if any (Levin and Rappaport-Hovav 1994, 1995, Reinhart 2000, Siloni 2002, Horvath and Siloni 2008, 2010a, 2010b, Marelj 2004). The lexicon is regarded as an interface between the conceptual system and the computational system. It contains coded concepts along with their thematic grids, and it functions as a computational component which can perform valence-changing operations pre-syntactically.

2.2.1. Valence-changing Operations

Valence-changing operations manipulate the thematic grids of verbs by reducing, adding or modifying thematic roles. In this work, I focus on five types of operations.

Passivization is an operation that saturates the external agent theta role (Chierchia 2004, Reinhart and Siloni 2005). The external role is not mapped onto the subject position, but it is present at the level of interpretation. Passive forms license agent-oriented adverbs, a by phrase and instruments, which all require the presence of an agent role in the semantics.² As shown in (1b), a by-phrase can be added to the passive predicate since the agent is still semantically accessible.

² In MH and PA it must be interpreted as an agent, but the input can also have a cause role. In English it does not have to be an agent (see Meltzer-Asscher, to appear). Meltzer-Asscher also argues that English passives include a syntactically realized external argument, whereas in Hebrew the implicit argument exists in the semantic representation only (see Baker, Johnson and Roberts 1989, Borer 1998 and Collins 2005 for further discussion of the operation).

- (1) a. John wrote the letter
b. The letter was written by John

Causativization adds a thematic role to the theta grid of the input. The set of verbs that can undergo causativization are either transitive verbs or intransitive verbs whose thematic grid contains an agent. The thematic role that is added in the operation is an agent (Reinhart 2000, Horvath and Siloni 2011a).

- (2) a. The soldiers marched up the hill
b. The commander marched the soldiers up the hill

The thematic grid of the verb *march* in (2a) includes an agent: the event that the verb represents involves the marcher. The transitive verb in (2b) is derived from the intransitive *march* by the addition of an agent to its thematic grid. Note that the thematic roles in both cases must be realized by animate arguments.³

Decausativization derives intransitive predicates by fully eliminating an external cause theta role (Reinhart 2002, to appear). The predicate's valence is reduced, and the verb loses its accusative case. The reduced thematic role of cause is no longer accessible at the level of interpretation (see also Dimitriadis (to appear)). The thematic grid of verbs that can undergo decausativization must contain a thematic cause role and not a role that is obligatorily agentive. Compare the verb *melt* in (3) with the verb *write* in (4). The thematic grid of *melt* consists of a cause that can be realized as an agent but also as a natural force (the sun). Therefore, the argument that causes the action of melting can be either inanimate or animate (3a). Consequently, the verb is an appropriate candidate for decausativization, as shown in (3b). It is impossible to add a by-phrase in (3b) because the reduced role does not exist even at the level of interpretation, in comparison to passivization (1b). In contrast, the thematic grid of the verb *write* has an obligatory agent, as in (4a): the entity that writes must be animate.

³ See Horvath and Siloni (2011) for evidence that the agent role of the input is adjusted and ceases to play the role of the entity that causes the event at hand (e.g., it does not license agent-oriented adverbs). This is expected given the each thematic relation can be instantiated only once per predicate (as often observed, see Bresnan 1982, Carlson 1998, Parsons 1990, Pesetsky 1995, Williams 1981, among others). See Horvath and Siloni (2011) for an extensive discussion.

Thus this verb is not a candidate for decausativization, and indeed it cannot undergo that operation (4b). Verbs that are the output of decausativization are labeled ‘decausatives’.

- (3) a. John/The sun melted the ice
b. The ice melted (*by John/the sun)
- (4) a. John wrote the letter
b. *The letter wrote

The verbal alternation captured here by decausativization is sometimes regarded as an instance of causativization (Pesetsky 1995, Embick 2004, Harley 1995, 2006, Pylkkänen 2002, 2008, among many others). Reinhart (2002, to appear), Reinhart and Siloni (2005) and Horvath and Siloni (2010a, 2011a, 2011b) provide arguments that causativization and decausativization are distinct operations.⁴ Note that under this analysis the two operations are different with regard to both directionality and the set of input verbs on which they apply.

Reflexivization and **reciprocalization** derive intransitive predicates, but unlike decausativization, they do not eliminate a theta role. Instead, a theta role (from the complement domain) that is not mapped onto a syntactic argument position is present in the semantics of the resulting predicate and both roles are associated with the same argument (Reinhart & Siloni 2004, 2005, Siloni 2008b and references therein). In both cases the syntactic valence of the verb is reduced, as it is in passivization and decausativization. Reflexivization and reciprocalization differ in their semantics: in reflexivization an agent acts on itself (5b), while in reciprocalization two or more agents act on each other (6b).

- (5) a. John washed himself.
b. John washed.

⁴ For further discussion of the direction of derivation see also Lakoff (1971), Saad and Bolozky (1984), Grimshaw (1982), Haspelmath (1987, 1993), Alsina (1992), Wunderlich (1997), Kratzer (2004), Marelj (2004), Alexiadou, Anagnostopoulou and Schäfer (2006), Kallulli (2007, 2009), Alexiadou and Anagnostopoulou (2009), Koontz-Garboden (2009), Rákosi (to appear) among others.

- (6) a. John and Mary kissed each other.
b. John and Mary kissed.

2.2.2. The Lexicon-Syntax Parameter

While valence-changing operations apply cross-linguistically, languages vary with regard to the component of grammar where certain operations, such as reflexivization, apply (Reinhart and Siloni 2005, Horvath and Siloni 2008). Reinhart and Siloni (2005) suggest that thematic operations can apply in the lexicon or in the syntax according to parametric selection. The relevant parameter is stated as follows:

- (7) The Lex-Syn Parameter (Reinhart and Siloni 2005)

UG allows thematic operations to apply in the lexicon or in the syntax

In some languages (e.g. Hebrew, Hungarian), the value of the parameter is set to ‘lexicon’ for operations like reflexivization and reciprocalization, and in others (e.g. French, Romanian), the value of the parameter is set to ‘syntax’. The setting of the parameter determines a cluster of syntactic and semantic properties.

Following Reinhart and Siloni (2005) and Siloni (2008b, to appear), I assume that causativization, decausativization, reflexivization and reciprocalization in MH and PA apply in the lexicon, in contrast to MH passivization, which applies in the syntax (Horvath and Siloni 2008). This division of labor between the lexicon and the syntax is evidenced by a list of syntactic and semantic features that exhibit a distinction between the lexical and syntactic operations. Verbs that are derived by lexical operations allow nominalizations of the derived predicate and semantic drifts. In addition their productivity is relatively low as there are gaps in their application. Syntactic operations, in contrast, are highly productive and verbs that are their output do not undergo semantic drift and do not give rise to nominalizations.

2.3. Morphology and Its Status in the Grammar

The proposed analysis sheds light on the status of morphology in the grammar and its interaction with the lexicon and the syntax. It relates closely to the Split-Morphology

Hypothesis (Anderson 1977, 1982, Scalise 1984, 1988, Perlmutter 1988), according to which derivation and inflection are distinct and belong to separate components of the grammar. Inflection and derivation have traditionally been treated as distinct, and differences between them, including productivity and locus of application, have been discussed. However, there is actually no solid division between them (Aronoff 1976, Anderson 1981, 1992, Schwarzwald 1998a, 1999a, 2001b, 2002, 2007, Bybee 1985, 1988, 1995, Stemberger and MacWhinney 1988, Badecker and Caramazza 1989, Jensen 1990, Spencer 1991, Spencer and Zwicky 1998, Dressler 1989, Booij 1996, 2005, 2006, Beard 1998, Stump 1998, among others). I follow Anderson's (1982, 1992) proposal that inflection is relevant to syntax while derivation is not. Inflection is the case in which principles of syntactic structure and of word formation interact with one another: it changes grammatical features such as tense and agreement of gender, person and number and specifies the grammatical function of words in a phrase without altering their meaning.⁵ Derivation basically creates new words with new meaning. Thus valence-changing operations are regarded as derivational in this study.

I distinguish between two types of derivational operations: those which apply in the lexicon and those which apply in the syntax. In other words, derivational morphology can apply in both of these components of the grammar. As stated by Anderson (1992:5), "word structure can only be understood as the product of interacting principles from many parts of the grammar: at least phonology, syntax and semantics in addition to the lexicon. As such, morphology is not a theory that deals with the content of one box in a standard flowchart-like picture of a grammar, but rather a theory of a substantive domain whose content is widely dispersed through the grammar". This is the central insight of the Parallel Morphology model (Borer 1991), which argues for the existence of an autonomous morphological component that interacts with both the lexicon and the syntax and which is not reducible to syntactic processes.

⁵ See Anderson (1992), Haspelmath (1996), Booij (2006) among many others for the discussion of different types of inflection.

2.4. Summary

I assume in this study that the mental lexicon is an active component of the grammar both thematically and morphologically. The lexicon is not fully transparent and contains gaps and idiosyncrasies, in contrast to the syntax, which is transparent and productive, though allowing fewer exceptions. I will show that despite the idiosyncrasies, there are systematic guidelines that regulate word formation in the lexicon. The organization of the lexicon can be summarized as follows:

- a. It consists of words: coded concepts together with their morpho-phonological representation.
- b. Words are organized in paradigms based on their form and meaning. Paradigms are accessible to processes that take place in the lexicon.
- c. There are (at least) two mechanisms that apply in the lexicon:
 - (i) a thematic-semantic mechanism, responsible for valence changing (and possibly other semantic modifications, as well)
 - (ii) a morphological mechanism, responsible for forming words by modifying existing ones.

The approaches advanced in this dissertation stand in contrast to syntacticocentric approaches such as the Distributed Morphology (hereafter DM) approach (Halle and Marantz 1993, Marantz 1997, 2000a, 2000b, 2001 among others) and Borer's approach (1998, 2001, 2004), which reduce the operative role of the lexicon entirely, transferring all derivational procedures to syntax (see also Doron 2003a, Arad 2003, Manzini and Savoya 2004 among others). Such approaches view the lexicon as mere lists of roots, whose argument structure can be manipulated only in the syntax, by merging with functional heads. Theories that are couched within this framework suggest architecture of the grammar that includes a single generative engine. I will highlight the advantages of the active lexicon approach throughout the dissertation.

The next chapter examines the morphological manifestation of thematic operations in MH and PA, focusing on the differences between morpho-phonology which applies to lexical outputs in the lexicon and that which applies to syntactic outputs in the syntax.

It should be noted that the term 'morphology' has a wide interpretation, as it is relevant not only to word structure, but also to meaning and to the syntax. In this dissertation, I use the term 'morphology' and 'morphological relations/properties' to denote only structural relations or properties.

Chapter 3. The Morpho-phonology of Thematic Operations

This chapter examines the morpho-phonological manifestation of valence changing, and specifically the morpho-phonological differences between syntactic and lexical operations. It is crucial to distinguish between the valence changing operations and the morphological processes that manifest them, as these are two different facets of the derivational relations. However, while I adopt the view that these are two independent mechanisms in the grammar, I argue for a clear correlation between them. This correlation also results from the component of the grammar where each operation takes place, i.e. the lexicon or the syntax, and from the types of morpho-phonology that apply in it. I begin by providing a general background on the verbal systems of MH and PA (3.1) and then turn to the analysis of the differences between the two types of mechanisms (3.2). After motivating the claim that syntactic and lexical operations are manifested by two types of morpho-phonology, I turn to the case of PA passivization and show that unlike in MH, it should be considered as a lexical operation (3.2.1).

3.1. The Verbal Systems of MH and PA

Thematic operations in MH and PA typically have a morphological manifestation. Thematically related verbs in MH and PA share the same stem consonants and are represented in different prosodic templates with a vocalic pattern, called *binyanim* (*binyan* sg.) (Berman 1978, Bolozky 1978, 1982, Schwarzwald 1974, 1981a, 2001a, Glinert 1989, Goldenberg 1998, Bat-El 2011, among others). The *binyan* determines the phonological shape of the verb, i.e. its vowels, prosodic structure and affixes (if any). The phonological shape of a verb, unlike that of a noun, is essential for determining the shape of the other forms in the inflectional paradigm (Berman 1978, Bolozky 1978, Bat-El 1989, Aronoff 1994a, 2007). MH and PA *binyanim* are presented in (8) and (9) respectively.⁶

⁶ The examples in this study are in their past form, which is the citation form, conventionally assumed to be the base of formation throughout the inflectional paradigm, as it is free of inflectional suffixes (see Ussishkin (1999) and Bat-El (2003), among others). However, the direction of derivation is

(8) MH binyanim⁷

Binyan	Example	
CaCaC	katav	'write'
niCCaC	niršam	'register'
hiCCiC	himšix	'continue'
CiCeC	limed	'teach'
hitCaCeC	hitlabeš	'get dressed'

(9) PA binyanim⁸

Binyan	Example	
CaCaC	katab	'write'
CaCCaC	ballaš	'begin'
Ca:CaC	ja:wab	'answer'
aCCaC	adʿrab	'strike'
tCaCCaC	tfarraj	'watch'
tCa:CaC	tfa:raq	'split up'
inCaCaC	insaraq	'be stolen'
iCtaCaC	ištarak	'participate'
iCCaCC	iħmarr	'blush'
istaCCaC	istaʿmal	'use'

Valence changing in MH and PA typically goes hand in hand with binyan change, as demonstrated for MH decausativization in (10). The transitive verb *kimet* 'creased' is formed in *CiCeC* (10a), while its decausative counterpart is formed in *hitCaCeC* (10b).

- (10) a. dan **kimet** et ha-meʔil
 'Dan creased the coat'
- b. ha-meʔil **hitkamet**
 'The coat creased'

irrelevant for the purposes of my analysis. The same analysis could hold under the assumption that either the present or future form is the basic form (see Horvath (1981), McOmber (1993), Benua (1997), Benmamoun (1999)).

⁷ This dissertation does not include an analysis of the *nitCaCeC* binyan. This form is used exclusively in a high register and every verb a *hitCaCeC* counterpart and has no independent existence (Shatil 2009, Siloni 2008, Bolozky 2010).

⁸ The *iCCaCC* binyan is highly rare in PA and it is used mainly to denote color change. It is therefore not discussed in this study.

MH and PA binyanim differ from one another mainly in the type of predicates they host (Rosén 1956, 1977, Berman 1978, Bolozky 1978, Schwarzwald 1981a, 2001a, 2009a, Ravid 2004, 2008, Fassi Fehri 1994, Ephratt 1997, Doron 1999, Arad 2003, 2005, Coffin and Bolozky 2005, among others). For example, reflexive verbs are mostly formed in the *hitCaCeC* in MH (e.g. *hitraxec* ‘wash oneself’) and in *tCaCCaC* in PA (e.g. *tmaššat*^r ‘comb oneself’). However, it is crucial to note that the thematic division of labor among the binyanim is only a tendency and is subject to a great deal of irregularities. For example, the MH verb *hitʔalel* ‘abuse’ is a basic entry in the lexicon and although it is not a reflexive verb, it is nevertheless formed in *hitCaCeC*. Also, the relation between the binyanim is sometimes expressed in semantic relations that are not the result of valence changing: e.g. the PA verb *qadaḥ* ‘make a hole’ (*CaCaC*) has an intensive counterpart *qaddaḥ* (*CaCCaC*) ‘make several holes’. However, such relations are relatively less common and the main criterion that distinguishes binyanim is thematic. Although the selection of a binyan cannot be fully predicted based on thematic features of a verb, the binyanim do have a preference for certain predicates, as will be discussed in detail in chapters 4 and 5.

3.2. Morpho-phonological Differences between Lexical and Syntactic Operations

I assume that MH passivization is syntactic (Horvath and Siloni 2008), while all the other thematic operations in MH and PA are lexical Reinhart and Siloni (2005). In Laks (2006, 2007a,), I show that passivization in Modern Standard Arabic (hereafter MSA) is also syntactic, as in MH. These studies show that the distinction between lexical and syntactic operations is based only on syntactic-semantic properties of the operations and is independent of the morphological processes that manifest them. In fact, there are languages like English where valence changing has no morphological manifestation (e.g. the verb *wash*, which is both transitive and reflexive). Still, the syntactic-semantic distinction between the two types of operation holds for such languages as well.

I provide morpho-phonological support for the distinction between lexical and syntactic operations. Based on the comparison and analysis of valence changing in MH and PA, I argue that lexical and syntactic operations also have different morpho-phonological behavior. MSA passivization (section 3.2.1) provides further support for the sharp contrast between the morpho-phonology of the two types of operation. The morpho-phonology of MH and MSA passivization is relatively steady and predictable, transparent, productive and is mostly manifested by a segmental alternation that does not affect the prosodic structure of the verb. Lexical operations are less predictable with regard to the shape of their output forms, they are less productive and transparent, and are usually manifested by a prosodic alternation of the verb, in addition to a possible segmental change. The two types of morpho-phonological behavior split valence changing into two groups. The split matches the split suggested between operations into those that apply in the lexicon and those that apply in the syntax (based on syntactic and semantic properties). The locus of application of valence changing depends on the type of operation and the parametric setting of a specific language. Assuming that thematic operations can apply in different components, every locus shows relatively different (though partially overlapping) morpho-phonological manifestations. Such a distinction helps setting a parametric choice and facilitates acquisition.

The distinction between the morpho-phonology of lexical and syntactic operations is to a great extent similar to the well known distinction between derivation and inflection (see 2.3). Valence changing operations are considered derivation, regardless of the component of the grammar in which they apply. However, lexical operations show the typical features of derivation, while syntactic ones have characteristics of inflection. Note that this distinction does not contradict Anderson's (1992) observation that inflection includes what is relevant to syntax (see 2.3). Passivization is not inflection because it is not relevant to the syntax, but it does apply in the syntax. The Lex-Syn parameter (see 2.2.2) suggests that derivational operations of valence

changing can apply in the lexicon or in the syntax, regardless of inflection, which is syntactic.

I now turn to the morpho-phonological differences between the two types of operations. Note that some of the differences are discussed in great detail in this section, while others are mentioned only briefly, with reference to subsequent sections, where they are discussed in detail.

3.2.1. Phonological Differences

In phonological terms, syntactic operations are generally manifested by a change in the vocalic pattern of the transitive verb, while lexical operations demonstrate various types of morphological processes that may induce prosodic change in addition to segmental change.

MH and MSA passivization is manifested almost exclusively by a process labeled melodic overwriting (McCarthy and Prince 1986, 1990, Steriade 1988, Bao 1990, Yip 1992, Bat-El 1994), where the vocalic pattern of the active verb changes. In MH, the vocalic pattern of transitive verbs changes into *u-a*; *CiCeC* transitive verbs change into *CuCaC* (11a) and *hiCCiC* verbs change into *huCCaC* (11b).

(11) Hebrew Passivization

- a. u a
 ↑ ↑
 si per ‘told’ → supar ‘was told’
- b. u a
 ↑ ↑
 hiš lix ‘threw’ → hušlax ‘was thrown’

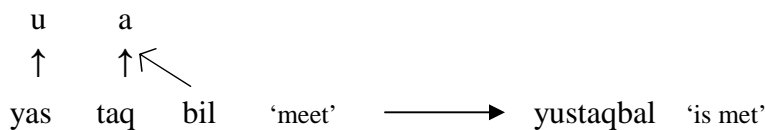
In MSA, the vocalic pattern of transitive verbs change into *u-i* in the perfective (12a) and to *u-a* in the imperfective (12b).

(12) MSA passivization

Base	Derived Form	
a. Perfective		
kasar	kusir	'broke'
saaʔad	suuʔid	'helped'
ʔarsal	ʔursil	'sent'
tanaawal	tunuuwil	'handled'
ʔintaxab	ʔuntuxib	'elected'
ʔistaqbal	ʔustuqbil	'met'
b. Imperfective		
yaksur	yuksar	'break'
yusaaʔid	yusaaʔad	'help'
yursil	yursal	'send'
yatanaawal	yutanaawal	'handle'
yantaxib	yuntaxab	'elect'
yastaqbil	yustaqbal	'meet'

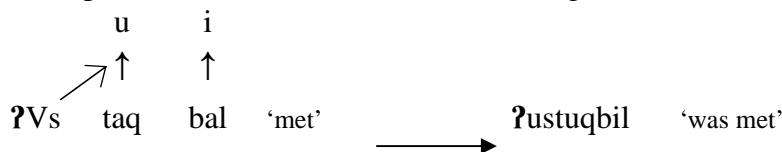
The base vowels are replaced by the vowels of the vocalic pattern in one-to-one fashion from left-to-right, as in McCarthy (1981) association of the root consonants with the C slots. When there are more vowels in the base than in the vocalic pattern, the rightmost vowel spreads, replacing the rest of the vowels.

(13) MSA imperfective forms: Melodic Overwriting



The direction of spreading seems different in the perfective and the imperfective forms. This is because the first vowel of the imperfective form is epenthetic; it is inserted in order to avoid a word initial consonant cluster or vowel, which are prohibited in MSA. That is, the epenthetic vowel is filled only after melodic writing takes place.

(14) MSA perfective forms: Melodic Overwriting



So passivization in MH and MSA is formed by melodic overwriting, which applies to the segmental level only.⁹ Melodic overwriting does not alter the prosodic shape and is therefore deemed less intrusive.

Other thematic operations in MH, PA, and MSA involve more intrusive processes, some of which alter the prosodic structure of the base. Such processes include affixation, prefix replacement, gemination, melodic overwriting and a combination of these processes, as demonstrated below.

(15) Types of morpho-phonological processes in PA and Hebrew

Type of Operation	Base	Derived form
a. Affixation		
PA reflexivization	maššat ^ʕ ‘comb’	tamaššat ^ʕ ‘comb oneself’
PA reciprocalization	kaatab ‘correspond with’	takaatab ‘correspond with each other’
PA decausativization	fataḥ ‘open’	infataḥ ‘become open’
MH decausativization	šavar ‘break’	nišbar ‘become broken’
b. Affixation and melodic overwriting		
MH reflexivization	raxac ‘wash’	hitraxec ‘wash oneself’
MH reciprocalization	nišek ‘kiss’	hitnašek ‘kiss each other’
MH causativization	xatam ‘sign’	hextim ‘make X sign’
c. Affix replacement and melodic overwriting		
MH decausativization	higiz ‘make upset’	hitragez ‘become upset’
	hivhil ‘make scared’	nivhal ‘become scared’
d. Gemination		
PA causativization	mad ^ʕ a ‘sign’	mad ^ʕ d ^ʕ a ‘make X sign’
e. Melodic overwriting		
MH causativization	lamad ‘study’	limed ‘teach’

Unlike the passivization of other verbs in the language, passivization of MH *CaCaC* verbs are formed by binyan change to *niCCaC*, e.g. *lakax* ‘take’ and *nilkax* ‘be taken’.¹⁰ This is problematic to the distinction between the processes involved in syntactic and lexical operations. We would expect *CaCaC* transitive verbs to change

⁹ Melodic overwriting does not involve reference to the consonantal root and operates directly on the stem (Bat El 1996, 2002). This provides support for a word based derivation, discussed in 2.1.1.

¹⁰ See Schwarzwald (2008) for an extensive discussion of the status of *niCCaC*.

into *CuCaC*. Data from Biblical Hebrew indicate that some *CaCaC* verbs did have *CuCaC* passive counterparts, e.g. *lukax* ‘be taken’ (see Gesenius 1910, Doron 1999, Schwarzwald 2008, 2009b), but such a formation does not apply to MH *CaCaC* verbs.

Experimental data show that the formation of *CaCaC* passive forms is less stable because of its irregular morphology (Laks 2006). 50 native MH speakers between the ages of 12 and 47 were asked to form the passive forms of nonce-verbs in three different binyanim: *hiCCiC*, *CiCeC*, and *CaCaC*. The questionnaire consisted of 18 sentences, where each sentence contained two coordinated clauses. The first clause consisted of an event described by an active verb, and the second contained a paraphrase of this event in the passive voice. The participants had to fill in the missing verb. The second clause contained a by-phrase in order to make participants use the passive form and to prevent an alternation with the decausative form. 8 sentences contained a nonce verb of *CaCaC* and 8 sentences contained a nonce verb of the *CiCeC* and *hiCCiC* (4 of each)¹¹. The results are almost unanimous with regard to the passive forms of *CiCeC* and *hiCCiC*. 94% of the subjects used *huCCaC* as the passive of *hiCCiC* and 92% chose *CuCaC* as the passive of *CiCeC*. This shows that melodic overwriting is highly productive in passive formation of *hiCCiC* and *CiCeC*. The results for the *CaCaC* binyan are significantly different. On average, 59% of the subjects chose *CuCaC* as the passive form of *CaCaC*, while 30% chose *niCCaC* as its passive form.¹² This means that a speaker can choose different forms as the passive of *CaCaC*.¹³ While reasons for the formation of passive verbs in *niCCaC* are not entirely clear, the results of the experiment show that such formation is indeed perceived by speakers as irregular for passivization and therefore speakers tend to form the passive counterparts of new *CaCaC* verbs via melodic overwriting. By doing so they form all

¹¹ Participants had to fill in the passive form as demonstrated below (see Laks 2006 for more details and examples).

(i) rami lasak et ha-bayit, klomar ha- bait _____ al-yedey rami

‘Rami lasak (nonce-verb) the house, i.e. the house _____ by Rami’

¹² Some subjects chose other forms for the passive verb, but their percentage is clearly insignificant.

¹³ See Ravid, Landau and Lovetski (2003) and Armon-Lotem and Koren (2008) for the discussion of the acquisition of MH passivization.

passive verbs using a morphological process that is more typical to the syntax (see Laks 2006 for further discussion). Although *niCCaC* is the passive counterpart of *CaCaC* within existing forms, speakers are reluctant to use it.

To sum up, morpho-phonology tends to distinguish between lexical and syntactic operations, where the latter ones enjoy a less intrusive morpho-phonology. It is crucial to bear in mind, though, that there is no dichotomy with regard to the two types of operations and that the above distinctions reflect tendencies.

3.2.2. Transparency and Exclusivity

MH and MSA passivization are syntactic and thus morphologically transparent, while lexical operations are less transparent. The passive verbs have an exclusive passive meaning. Melodic overwriting of verbal forms has a unique function with regard to valence changing, as forms with the vocalic pattern of *u-i* or *u-a* do not host other types of predicates.¹⁴ This makes the morphological process responsible for passivization highly transparent as these overwritten forms are exclusively identified as passive. This correlates with the transparency of the processes that apply in the syntax in general. Take, for example, the inflectional process of forming the first person plural suffix of both MSA and PA past forms. The suffix *-na* can attach freely to any verb, regardless of the binyan, and it is used only to indicate first person plural (e.g. *katabna* ‘we wrote’ and *ʔistaqbalna* ‘we met’).

In contrast, the morphology of lexical operations is less transparent. In both languages, binyanim that host the output of lexical operations can be used for several types of derived verbs as well as basic entries in the lexicon. PA *CaCCaC*, for example, is used for both causative verbs that are derived by adding a thematic role (e.g. *raqqas*^f ‘make dance’, causative of *raqas*^f ‘dance’), as well as for basic entries in the lexicon that are not derived from any other predicate (e.g. *mawwal* ‘finance’). MH

¹⁴ There is, however, a small group of MH decausative verbs with a passive morphology, e.g. *huksam*, derived from *hiksim* ‘charm’ and *hufta*, derived from *hiftia* ‘surprise’. Landau (2002) argues that they have only a decausative interpretation and labels them ‘fake-passives’, while Meltzer (2006) suggests that they are ambiguous and also share a passive meaning. As noted in 3.2.1, melodic overwriting is not restricted to syntactic operations (see also 7.5).

hitCaCeC hosts various types of verbs including reflexives (*hitraxec* ‘wash oneself’), reciprocals (*hitkatev* ‘correspond’) and decausatives (*hitragez* ‘become upset’) as well as some basic entries (*hitxanen* ‘implore’).

Moreover, verbs that are derived via lexical operations can share more than one meaning, i.e. the same form is used as the output of more than one operation.¹⁵ This is attested in some *hitCaCeC* verbs (Siloni 2008a). For example, the transitive verb *irbev* ‘mix’ has both reflexive (16a) and decausative (16b) alternates, both sharing the same form *hitʔarbev*.

- (16) a. keday še-titʔarbev ba-kahal
 ‘You should mingle (mix yourself) within the crowd’
 b. ha-tavlinim hitʔarbevu
 ‘The spices became mixed’

3.2.3. Predictability

The morphological output of passivization is predictable, unlike that of lexical operations. The only change that occurs in passivization is in the vocalic pattern. Each of the passive templates in both MH and MSA is related to a single corresponding binyan in which its transitive counterpart is formed. Templates such as MH *CuCaC* and *huCCaC* do not have an independent existence; they serve almost exclusively as the passive form of *CiCeC* and *hiCCiC* respectively.

This is not true for the binyanim that feed lexical operations, since there is no one-to-one relation between all pairs of binyanim. Some lexical operations have more than one corresponding output binyan. Examine, for example, MH decausativization. When the base is in *CiCeC*, its decausative counterpart is almost always formed in *hitCaCeC* (e.g. *rigeš* ‘make excited’ - *hitrageš* ‘become excited’). However, when the base is in *hiCCiC* the derived decausative verb can be formed either in *hitCaCeC* (e.g. *hilhiv* ‘make enthusiastic’ - *hitlahev* ‘become enthusiastic’) or in *niCCaC* (e.g. *hirdim* ‘put to

¹⁵ However, French verbs that are derived in the syntax can also be ambiguous. This matter is beyond the scope of the current study.

sleep' - *nirdam* 'fall asleep') for no apparent reason. In Chapter 5, I provide evidence that the selection of one binyan over another can be partially predicted by morpho-phonological constraints that may also block the application of phonological processes. However, in many cases, this selection seems arbitrary.

Additionally, several verbs in the MH binyan *hiCCiC* do not undergo any morphological change as a result of decausativization. The verb *hexmir* 'make/become worse', for example, is manifested both as a transitive (17a) and a decausative predicate (17b) (see Borer 1991).

- (17) a. ha-raav hexmir et macavo
'The starvation made his condition worse'
b. macavo hexmir
'His condition became worse'

Similarly, some PA verbs are formed in *CaCCaC* and are both transitive and decausative (e.g. *kattar* 'increase').

The lack of morphological alternation adds to the variety of combinations of input-output relations resulting from lexical operations. Unlike passivization, which demonstrates one-to-one relations between bases and derived forms, lexical operations occur in different shapes, and there is no complete match between form and meaning with regard to binyanim¹⁶. MH *hiCCiC*, for example, is traditionally regarded as a causative form (Gesenius 1910). While this is indeed the unmarked binyan for causativization (e.g. *hextim* 'made X sign'), it nevertheless exhibits all kinds of predicates, such as PP-taking verbs (*hikšiv* 'listened'), transitive verbs (*higiz* 'upset') and decausatives (*hivri* 'became healthy').

Observation of the verbal systems of the two languages does not allow predicting as to whether a particular stem will or will not occur in a given binyan. The systems have a large number of accidental gaps (Horvath 1981). This supports the claim that the alternation of binyanim is lexical as it represents lexical thematic operations and

¹⁶ See, for example, Doron (1999, 2003a) for a different view.

such operations are subject to gaps and suppletion. It is important to point out that I do not claim that the possible input-output forms of lexical operations are totally free. There is a limited set of forms for every operation, e.g. there would be no reflexive or reciprocal predicate in the PA *CaCCaC* binyan or in the MH *CiCeC* binyan. I do, however, argue that this set of options is much more varied in comparison with that of syntactic operations.

3.2.4. Chain Derivations

The output of lexical operations can feed further lexical operations, whereas the output of syntactic operations cannot. Since lexically derived predicates are part of the lexicon, they are accessible and can undergo additional valence changing. The MH verb *hilbiš* ‘dressed’, for example, is derived from the transitive verb *lavaš* ‘wore’ by causativization. The output form *hilbiš* is used as an input form for the derivation of the reflexive form *hitlabeš* ‘dress oneself’ (18).¹⁷

The output of lexical operations can also feed semantic operations that are not thematic. That is, they do not manipulate the thematic grid of the verbs. Rather, they change some semantic feature like lexical aspect. The verb *hitlaxeš* ‘whisper to one another’, for example, is derived from *laxaš* ‘whisper’ by reciprocalization. The derived reciprocal verb is the input of the formation of the repetitive verb *hitlaxšeš* ‘whisper to one another repeatedly’, which is formed by reduplication of one of the stem consonants.

¹⁷ The verb *hitlabeš* cannot be analyzed as derived from *lavaš*, as its reflexive meaning does not stem from *lavaš*, but from *hilbiš*. *hitlabeš* does not mean *lavaš et acmo* ‘wore himself’ but rather *hilbiš et acmo* ‘dressed himself’.

(18) Chain derivations in MH¹⁸

Base →	Derived / Base →	Derived
lavaš 'wear'	hilbiš 'dress'	hitlabeš 'dress oneself'
nasa 'marry'	nisa 'marry one another'	hisi 'marry X and Y'
laxaš 'whisper'	hitlaxeš 'whisper to one another'	hitlaxšeš 'whisper to one another repeatedly'
nam 'sleep'	nimnem 'took a nap'	hitnamnem 'took a short nap'

Anderson (1992) claims that a lexical rule may presuppose the application of another lexical operation, but it is not expected to presuppose the application of a syntactic rule, since such rules do not apply within the lexicon. Lexical rules apply to one another's output, but not to the output of syntactic rules. This intertwines with the framework of Lexical Phonology (Kiparsky 1982, Mohanan 1986, Goldsmith 1993), according to which, a subset of phonological rule applies in the lexicon in accordance with morphological operations, and another subset applies post-lexically (see 2.1.1). Applying this observation to thematic operations, the output of lexical operations can feed further lexical operations, while the one of syntactic operations cannot. There are only a few cases of chain derivations in the operations studied here, but among them there is not even one syntactic. The existence or lack of chain derivations intertwines with the differences in idiom formation and semantic drifts. Syntactic operations cannot feed such processes, which are considered lexical (Horvath and Siloni 2008). Similarly, chain derivation can only be based on the output of lexical operations and not syntactic ones. Once a predicate is formed outside the lexicon, it is no longer accessible to further lexical operations.

3.2.5. Variation and Change

Verbs that are the result of lexical operations, as well as basic entries in the lexicon, are subject to morphological variation, where a specific verbal meaning becomes associated with an additional binyan without meaning shift. This results in verb forms

¹⁸ Some of the examples include the formation of repetitive and diminutive verbs. Although I do not account for their derivation in this study, I believe them to be co-related via lexical operations (Laks 2006).

in different binyanim, with identical meaning. For example, MH decausative verbs *nirtav* and *hitratev* are formed in *niCCaC* and *hitCaCeC* respectively and they both denote ‘become wet’. In each such pair, one form is currently in greater token frequency than the other, but both forms are part of the speakers’ knowledge. I regard the possibility of alternating forms for a single predicate as a typical feature of predicates present in the lexicon. There is hardly any variation in the morphological shape of syntactically derived forms, such as MH passive verbs. In Chapter 6, I provide an analysis for the factors responsible for morphological variation. I show that morphological variation results from the interaction of morpho-phonological and thematic-syntactic criteria, and that this interaction is unique to the lexicon.

3.2.6. Productivity and Blocking

Syntactic operations are more productive than lexical operations in the sense that they apply almost freely without any type of restriction. Lexical operations are relatively less productive and they demonstrate blocking effects and lexical gaps, where verbs that conceptually can be derived are missing in the language.

The notion of productivity in linguistics and particularly in morphology has been the subject of vast research. Morphological productivity is commonly defined as the ability or potential of a word formation process to give rise to a new word formation on a systematic base (see for example, Adams 1973, Aronoff 1976, 1980, Bauer 1983, Spencer 1991, Plag 2003 and references therein). In some approaches, productive and unproductive word formation processes have different properties (see Jackendoff 1975, Bolozky 1999, 2001, Bauer 2001, Dressler 2003, among others). In others, gradedness plays a central role in productivity and the latter is based on schemas, constructions and local generalizations and results from various factors (Bybee 2001, Albright and Hayes 2003, Baayen 2003, 2008, Hay and Baayen 2005, Dabrowska 2004 among others).

MH and MSA passivization is productive in the sense that it is almost entirely exception free. There are no morpho-phonological, syntactic, or semantic constraints

that block passivization, and passive verbs can be formed from almost any transitive verb.¹⁹ The morphological component of the grammar is ‘blind’ with regard to the binyan of transitive active verbs. It is a free mechanism that can take any transitive verb, change its vowels and form a passive counterpart.²⁰ This non-conditioned formation is typical to processes that are assumed to apply in the syntax in general, like inflection, and provides further support to the proposed nature of the syntax as a module of the grammar that manufactures forms productively with a relatively small number of idiosyncrasies and blocking affects.²¹

The application of lexical operations is relatively less productive. It results in lexical gaps in the formation of reflexive, reciprocal, and causative verbs that could conceptually be derived, but for whatever reason they do not surface as actual words. It is important to note, though, that not every lexical operation demonstrates low productivity. The formation of decausative verbs, which is regarded as lexical for independent reasons (Reinhart and Siloni 2005), is highly productive cross-linguistically. However, all operations that apply in the syntax are productive. Thus, an operation with low productivity should be viewed as lexical.

There are also cross-linguistic differences with regard to the application of lexical operations on certain verbs. The verb *whisper*, for example, has a derived reciprocal counterpart in both MH and PA (19a). However, the verb *wink* has a reciprocal counterpart only in PA (19b).

¹⁹ There are a few gaps in MH passivization, but they do not result from morpho-phonology (See Doron 2003a and Meltzer-Asscher to appear).

²⁰ Note that there are few MSA passive verbs that are formed by binyan changing. The verb *qarrar* ‘decide’ for example, has a passive counterpart in the *tCaCCaC* (*taqarrar* ‘be decided’). Such examples are rare and I regard them as cases where passivization applied exceptionally in the lexicon, where such passive forms are stored. Indeed verbs like *qarrar* ‘decide’ do not undergo syntactic passivization via melodic overwriting (**qurrir* ‘be decided’) as they already have a lexical passive counterpart.

²¹ See 3.2.1 for the discussion of the irregular formation of MH *CaCaC* verbs, which are not formed via melodic overwriting.

(19) PA and MH reciprocalization

Verb	Language	Examples	
		Basic entry	Derived reciprocal
a. whisper	PA	wašwaš	twašwaš
	MH	laxaš	hitlaxeš
b. wink	PA	ya:maz	tya:maz
	MH	karac	*hitkarec

There seems to be no reason for the gap in (b). Conceptually, a MH verb like **hitkarec* ‘wink to one another’ could be derived without any morpho-phonological, syntactic, semantic, or pragmatic restrictions. In many cases, the lack of application of valence changing operations is arbitrary. However, I contend that some of the gaps are not coincidental and can be explained by the morpho-phonology. Chapter 7 is dedicated to the analysis of blocking effects on the application of lexical operations in MH and PA. I show that while some lexical gaps are arbitrary, many of them are predictable and can be accounted for by morpho-phonological criteria.

3.3. The Case of PA Passivization

So far, I have discussed the morpho-phonological differences between syntactic operations (passivization in MH and MSA) and lexical operations (causativization, decausativization, reciprocalization, and reflexivization in MH and PA). I now turn to the case of PA passivization, which based on its morph-phonological characteristics; I suggest that it is lexical and not syntactic. I show that the morpho-phonology of PA passivization is similar to that of other lexical operations in PA and MH, in contrast to MH and MSA passivization. I show this regarding three properties: morphological manifestation, productivity, and exclusivity/transparency.

3.3.1. Morphological Manifestation

Passive verbs in PA are formed in two binyanim: *inCaCaC* and *tCaCCaC* (see Rosenhouse 1991/1992, Younes 2000, and Tucker 2007). This is performed by agglutinating the prefix *t-* or *in-* to active verbs in the *CaCaC* and *tCaCCaC* respectively, similar to the formation of other verbs via lexical operations (see 3.2.1).

Such a formation is more intrusive with respect to the structure of the base form as it changes its prosodic structure by adding a new syllable (20a) or creating a consonant cluster (20b). In contrast to MSA and MH, melodic overwriting does not apply in PA passives, as well as in other Arab dialects (see, for example, Hallman 2002 for discussion of Lebanese Arabic).

(20) PA passivization

Base	Derived Form	
a. CaCaC → inCaCaC		
baʔa	inbaʔ	‘buy’
katab	inkatab	‘write’
qa:l	inqa:l	‘say’
qara	inqara	‘read’
saraq	insaraq	‘steal’
b. CaCCaC → tCaCCaC		
sʔallaḥ	tsʔallaḥ	‘fix’
laxxasʔ	tlaxxasʔ	‘sum up’
barra	tbarra	‘acquit’
naffaz	tnaffaz	‘implement’
raqqa	traqqa	‘promote’

3.3.2. Productivity

Compared to MSA passivization, PA passivization is not entirely productive even with regard to *CaCaC* and *CaCCaC* transitive verbs. There are transitive verbs formed in these two binyanim that do not have passive counterparts (21) for no apparent reason.

(21) PA transitive verbs with no passive alternates

Base	Derived Form	
a. CaCaC verbs		
wajad	*inwajad	‘find’
rasam	*inrasam	‘draw’
tarak	*intarak	‘leave’
b. CaCCaC verbs		
zayyaf	*tzayyaf	‘forge’
wasʔsʔa	*twasʔsʔa	‘recommend’
mawwal	*tmawwal	‘finance’

Any of the transitive verbs in (21) could conceptually have a passive alternate. This is evident by verbs such as *zayyaf* ‘forge’, which has a passive counterpart in

MSA (*zuyyif* ‘be forged’) but not in PA (**tzayyaf*). This low productivity is typical to thematic operations that apply in the lexicon, as in PA transitive verbs that do not have reflexive and reciprocal alternates. In Chapter 7, I also show that there are specific morpho-phonological constraints that block the formation of some PA passive verbs.

3.3.3. Exclusivity and Transparency

The morphology of PA passivization is not transparent, similarly to other verbs that are derived in the lexicon. The shape of passive verbs does not automatically indicate that they are passive, like lexically derived verbs. Also, verbs that are derived via lexical operations can share more than one meaning, i.e. the same form is used as the output of more than one operation. The *inCaCaC* and *tCaCCaC* templates are not used exclusively for passive verbs, in contrast to the overwritten forms in MSA that are used only for passivization (see Mahmoud 1991). PA passive templates also host other types of predicates. *tCaCCaC* is used for the formation of predicates that are derived by other lexical operations such as decausativization (22a) and reflexivization (22b) as well as basic (underived) entries in the lexicon (22c).

(22) Non-passive verbs formed in *tCaCCaC*

a. Decausatives	
twassax	‘get dirty’
tyayyar	‘change’
twarratʿ	‘get mixed up’
b. Reflexives	
tyassal	‘wash’
thammam	‘bathe’
txabba	‘hide oneself’
c. Basic entries	
twakkal	‘have confidence’
twaqqaʿ	‘expect’
tyadda	‘have lunch’
traddad	‘hesitate’
thadda	‘provoke’

The *inCaCaC* template, which is primarily used for passive and decausative predicates, can also host basic entries in the lexicon (23).

(23) Basic entries formed in *inCaCaC*

intabah	‘pay attention’
int ^ʔ a:q	‘be bearable’
ind ^ʔ amm	‘join’
infarad	‘be unique’

Consequently, PA verbs that are formed in the *inCaCaC* and *tCaCCaC* are not automatically considered as passive, as they are used for various predicates. In contrast, MSA passive forms are immediately identified as passive, as templates with the *u-i* or *u-a* melody can only have a passive meaning.

In addition, the mechanism that forms PA passive verbs is not ‘blind’ to the binyan of the active counterpart. The morphological component in the grammar has to know the binyan of the active transitive verb and accordingly form its passive alternate in the appropriate binyan. There is a one-to-one relation between the binyanim of active and passive verbs in PA, while in MSA, there is an across-the-board mechanism that forms a passive verb from any transitive verb, regardless of its binyan.

The morpho-phonological properties of PA passivization suggest that it applies in the lexicon and not in the syntax. Its productivity is low as it demonstrates gaps, its morphology is not transparent and it is similar to the one of other lexical operations in the language. Further research should reveal whether PA passivization also demonstrates the syntactic-semantic features that are typical of lexical operations.

3.4. Summary

This chapter examined morpho-phonological differences between lexical and thematic operations. These differences are summarized in (24).

(24) Morpho-phonological differences between syntactic and lexical operations

Property	Syntactic operations	Lexical operations
Type of morphological process	Mainly segmental changes: Melodic overwriting	Prosodic and segmental change: A wide array of morphological processes that are more intrusive towards the input
Transparency and exclusivity	Transparent: A unique mechanism that applies to all transitive verbs; i.e. the process is exclusive for passivization	Less transparent: The morphological mechanism examines the binyan of the active verb Non-exclusive process: Some binyanim host other types of predicates
Predictability	Predictable: The morphological manifestation is mostly the same	Less predictable: Two verbs that undergo the same operation can receive different morphological manifestations
Chain derivations	None: Syntactic outputs are not the input of further lexical operations	Possible: Lexical outputs can be the base for the derivation of other verbs
Morphological variation and change	None: Syntactic outputs do not change their form	Exists: Lexical output can be formed in an additional binyan
Blocking effects	None: Melodic overwriting applies across the board and is almost exception free	Exists: Morpho-phonological constraints can block the formation of lexical outputs

This chapter reveals a correlation between the morpho-phonology of valence changing operations and their locus of application, the lexicon or the syntax. The morpho-phonological properties in (24) show another aspect of the Lexicon-Syntax parameter, in addition to its semantic-syntactic features, and provide further support for its existence. It is important to point out that these differences are not manifested to the same extent in every language. Rather, it is a matter of relativity.

Marantz (2000b) ascribes the difference between the morphology of passive and other verbs to a structural difference between them. In the case of decausatives or reflexive verbs, the root is in a local relation with the verbal head that merges with it and therefore it can select its binyan. Following Kratzer (1996), Marantz assumes that

passives involve a voice head, which is located above the head *v*. Therefore there is no local relation between the voice head and the root, thus it cannot choose a binyan. I argue that this difference in morphology can be accounted for without assuming independent heads or roots and that all types of verbs can be formed on the basis of an existing word.

The differences in types of morpho-phonological processes primarily depend on the morphology of each language. However, we expect to find some differences in the morpho-phonology typical of lexical outputs of the lexicon and the one that is typical to the syntactic outputs cross-linguistically. The approach taken here intertwines with the Split-Morphology Hypothesis and the model of Parallel Morphology, according to which derivation and inflection are distinct, and belong to separate components of the grammar (see 2.3).

Because all valence changing operations in MH and PA are lexical, except for MH passivization, this study focuses on the characteristics of lexical operations, in particular, the criteria for binyan selection. I argue that binyan selection results from the interaction between morpho-phonological and thematic-syntactic criteria and that this interaction is unique to the lexicon. I now turn to the four domains in which I examine this interaction: verb innovation (Chapter 4), relations between existing forms (Chapter 5), morphological variation and change (Chapter 6) and morphological blocking (Chapter 7).

Chapter 4. Verb Innovation

This chapter examines the criteria determining binyan selection for new verbs. Verb innovation provides direct access to the process of verb formation and shows how different types of criteria and constraints are taken into consideration together. The verbal systems of MH and PA consist of five and ten binyanim respectively, yet only some of them are used to form new verbs. Some binyanim are not used at all for the formation of new verbs (e.g. PA *istaCCaC* and MH *niCCaC*), and others are used quite rarely (e.g. PA and MH *CaCaC*). This raises two main questions. First, why are some binyanim not active in new verb formation? Second, what are the criteria for selecting a binyan out of the binyanim that are used for the formation of new verbs? I argue that the selection of binyan in verb innovation is based on the interaction of morph-phonological and thematic-semantic criteria.

I study in this chapter the formation of denominative verbs based on either foreign words (e.g. PA *fannaš* and MH *fineš*, both derived from the English verb *finish*) or native ones (e.g. PA *raqqam* ‘number’, derived from the noun *raqam* ‘number’). On the morpho-phonological dimension, binyan selection is based on prosodic markedness, faithfulness to the base form and paradigm uniformity. On the thematic dimension, it is based mainly on the distinction between basic and derived entries in the lexicon as well as on semantic resemblance to other verbs.

I begin by providing a definition of verb innovation. I set criteria for distinguishing between cases of verb formation that are included in this analysis and those which are not (4.1). I then turn to the analysis of the criteria for binyan selection in verb innovation: thematic-semantic criteria (4.2) and morph-phonological criteria (4.3). I conclude by summarizing the criteria discussed in this chapter and the implications of the analysis for word formation specifically and the organization of the mental lexicon in general (4.4).

4.1. Verb Innovation

4.1.1. Definition

In this study, I examine verb innovation from a synchronic point of view: I take new verbs to be those which fall into one of two categories.

First, I consider verbs derived from loan words to be new. For example, the PA verb *barrak* ‘apply brakes’ is derived from the English noun *brake*. In such cases it is absolutely clear that the verb is based on the foreign word and not the other way around. Most examples discussed in this chapter are of this type.²²

Second, I examine denominative verbs formed from existing nouns or adjectives within the language (e.g. PA *tmarkaz* ‘become central’, derived from the PA noun *markaz* ‘center’.) These include only cases where it is clear that the verb is formed based on another word and not the other way around. In the case of *tmarkaz*, for example, the source *markaz* is in the noun template *maCCaC*, which denotes mainly places. This template includes a prefix *ma-* which is included in the stem of the verb. Thus, it is clear that the verb is formed based on the noun. This directionality is also evidenced by the semantics of the verb, as the notion ‘become centralized’ is based on the concept of ‘center’.

The point in time when a verb entered the language is not relevant here. Some verbs discussed here are recent innovations; others have been in the respective language for much longer. For example, MH *tilfen* and PA *talfan*, both denoting ‘phone’ are comparatively old verbs that presumably entered these languages when their speakers were exposed to the word *telephone*. In contrast, MH *simes* and PA *sammas* ‘send an sms’ are comparatively new, developed in parallel with the spread of the new technology. In both cases, it is clear that the verbs were formed on the basis of the respective nouns and not vice versa. This means that at some point in time, speakers formed a new verb and selected a specific morphological shape for it, based on an existing word, either in their language or in a different language. I will show that

²² See Ravid (1992) and Schwarzwald (1995, 1998b, 1998c, 1999b and 2009c) for an extensive discussion of foreign effects on MH, and Amara (1999) for foreign effects on PA.

the criteria for form selection are consistent over time, and I will therefore treat older verbs like 'telephone' in the same way as new verbs like 'sms'.

4.1.2. The verbal Systems of MH and PA

As noted in 3.1, every verb in MH and PA must be formed in a binyan. In languages like English, verbs can be formed based on other words either by zero conversion (e.g. *fax*, which is both a noun and a verb denoting 'send a fax') or by affixation (e.g. *generalize*, derived from the adjective *general*). In MH and PA, every verb that enters the language must conform to one of the existing binyanim. The MH verb *midel* 'make a model of', is derived from the borrowed English noun *model* 'model' and formed in the MH *CiCeC* binyan.²³ In general, some binyanim are more typical outcomes of valence changing operations, while others are used for the formation of basic entries.

While there are five binyanim in MH and nine binyanim in PA, only a few of the binyanim in each language are actually used in the formation of new verbs (Bolzky 1978, 1982, 1986 1999, Schwarzwald 1981a, 2002, Berman 1987). Other binyanim are used almost exclusively for existing forms. Why is this so? As mentioned in the beginning of the section, I will show that the process of selecting a binyan is based on the interaction of two types of criteria, morpho-phonological and syntactic-semantic. Morpho-phonological criteria for binyan-selection include the prosodic properties of the binyanim, as well as the structure of their inflectional paradigms and their relationship with the morpho-phonological properties of the base from which they are derived. Thematic-semantic criteria are based on the syntactic valence of the verb and its theta-grid, as well as the semantic field it belongs to. Thematic-semantic criteria are based on verbs' syntactic transitivity and their thematic grids as well as the semantic properties that are typical to some binyanim.

Examining the process of selecting a binyan provides direct 'on-line' insight to the intuitive knowledge of speakers, thereby shedding light on their internal grammar

²³ The foreign word that is used as the base for verb formation may also exist as a noun in MH or PA.

(Bolzky 1986, 2001, 1999, Baayen 1992, Schwarzwald 2001c). I will show that in choosing a binyan for a new verb speakers take into account several types of factors, both morpho-phonological and syntactic-semantic, and integrate them in order to form a new verb that conforms to the rules of the language.

4.1.3. Data Sources

The analysis of verb innovation in both languages, MH and PA, is mainly based on data I have gathered during the past five years. My first and main collection method relies on volunteer native speakers who documented the use of new verbs in their environments. Certain PA examples were provided by speakers of other dialects of Arabic, e.g. Lebanese Arabic. However, the criteria for binyan selection appear to be consistent across dialects. Other data comes from searches I conducted online and in various media, including newspapers and brochures. Some of the new verbs collected in one of these ways came into regular use, while others are examples of a single occurrence. Importantly, both types show the same criteria in binyan selection.

In addition, data were also collected from previous studies of denominative verb formation in MH (Bolzky 1978, 1986, 1999, 2003a, Schwarzwald 1981a, 2000, Bat-El 1994, Berman 1987, Ussishkin 1999a, 2005), as well as a few studies of new verb formation in Arabic (Teeple 2003, 2007, Al-Dobaian 2005).

The data include 531 instances of verb innovation in MH and 134 instances in PA. MH has more verb innovation than PA because the phenomenon of borrowing words into Arabic in general is relatively new. This is largely the result of a sense of cultural supremacy in the Arab world and the self-imposed isolation of Arabic-speaking Muslim peoples until the nineteenth century. Religious and puristic considerations (Ryder 1974) also played an important role in the linguistic history of Arabic: linguistic pride is bound up with the sanctity of the language of the Qur'an. Even the expansion of the Islamic Empire did not cause any major changes since embracing the faith necessarily implied learning the language (Newman 2002). Nevertheless, examination of the extant examples of new verb formation in PA indicates a strong

similarity between the criteria that are responsible for binyan selection in the two languages.

As shown in (25) and (26), some binyanim are highly active in verb innovation, while other are less frequently used or not used at all. The process of selecting a binyan is based on the interaction of two main types of criteria: thematic-semantic (4.2) and morpho-phonological (4.3).

(25) Verb innovation in MH

Binyan	Number of verbs
CiCeC	353 (66%)
hitCaCeC	125 (24%)
hiCCiC	41 (8%)
CaCaC	12 (2%)
Total	531 (100%)

(26) Verb innovation in PA

Binyan	Number of verbs
CaCCaC	93 (70%)
tCaCCaC	34 (25%)
CaCaC	7 (5%)
Total	134 (100%)

4.2. Thematic-semantic Criteria

4.2.1. Base vs. Derived Entry

Thematic-semantic criteria concern the syntactic valence of verbs, their thematic grids and the field they belong to. As discussed in 2.2, it is commonly assumed that different thematic realizations of the same concept (e.g. passive, reflexive) are derived from the same basic entry via thematic valence changing operations. As noted in 3.1, the binyanim in both languages are distinct from each other with regard to the type of verbs they tend to host. The PA reflexive verb *tḥammam* ‘wash’ in (27b) is derived from the transitive verb *ḥammam* in (27a) via a thematic operation that reduces the syntactic valence of the verb (see 2.2.1). The two verbs appear in different binyanim: as is generally the case, *CaCCaC* is used for the more basic entry, while *tCaCCaC* is used for the reflexive, which is the output valence changing.

- (27) a. zayd hammam nafso
 ‘Zayd washed himself’
 b. zayd thamman
 ‘Zayd washed’

The examination of verb innovation in both languages reveals a clear division of labor among binyanim with regard to the type of verbs they host. The main distinction is between binyanim that are used for basic entries and binyanim that host derived verbs.

MH *CiCeC* and *hiCCiC* are used for basic entries, as illustrated in (28) and (29).

- (28) Verb innovation in *CiCeC* (MH)

Base		Derived verb	
cad ²⁴	‘side’	cided	‘take sides’
esemes	‘sms’	simes	‘send an sms message’
rIf3r	‘refer’	rifrer	‘refer’
model	‘model’	midel	‘make a model’
deliver	‘deliver’	dilver	‘deliver a set up’
pančer	‘puncture’	pinčer	‘puncture’

- (29) Verb innovation in *hiCCiC* (MH)

Base		Derived verb	
klik	‘click’	hiklik	‘click’
kraš	‘crash’	hikriš	‘crash’
flik	‘a spank’	hiflik	‘spank’
seret	‘a movie’	hisrit	‘make a movie’

There is no semantic-syntactic distinction between *CiCeC* and *hiCCiC* with respect to verb innovation. As I will show in 4.3.2, the selection of one over the other arises purely from morpho-phonological criteria. *hiCCiC* has traditionally been regarded as a binyan that hosts causative verbs (for example, Gesenius 1990, Ornan 1971, 2003, Berman 1975b, Ben-David 1976,1978, Bolozky 1978, Schwarzawald 1981a, among many others). For example, the verb *hirkid* (*hiCCiC*) ‘make dance’ is derived from the verb *rakad* (*CaCaC*) ‘dance’. However, the formation of causative

²⁴ When the base contains two consonants, MH uses several techniques to form the verb in this binyan, e.g. reduplication of the last consonant. I do not discuss the motivation for each technique in this study (see Bat-El 1994, 2002, 2004 and Ussishkin 1999a, 2005).

verbs is not productive in MH: they are a closed set to which new members are hardly added. Examining new verbs that are formed in *hiCCiC* shows that they are no more causative than verbs formed in *CiCeC*. Compare, for example, *hiklik* ‘click’ and *simes* ‘send an sms message’ - both are active verbs that are formed in *hiCCiC* and *CiCeC* respectively, but none of them is more causative than the other (see Bolozky 1978, 1982, 1999 for extensive discussion).

Bolozky (1982, 1999) proposes that *hiCCiC* is used for the formation of causatives, while *CiCeC* is used for what he calls ‘general agentives’. But he also points out that there are exceptions to this generalization. Some speakers consistently assign ‘cause to be(come)’ causative verbs to *CiCeC* along with all other agentives. The distinction between ‘cause to do’ causatives and ‘cause to be(come)’ causatives is extraneous, as there is no real difference between the latter and general agentive verbs. Transitive verbs in both *CiCeC* and *hiCCiC*, as well as in other binyanim, can denote the causation of becoming, i.e. the causation of a change of state²⁵. Compare the following verbs in three different binyanim.

(30) MH transitive ‘change of state’ verbs

Binyan	Verb	
CiCeC	xisel	‘abolish’
hiCCiC	hexriv	‘ruin’
CaCaC	haras	‘destroy’

The three verbs in (30) share a rather similar meaning in which a change of state (becoming destroyed or extinct) is caused to the internal argument of the verb, regardless of binyan. There is therefore no reason to define only one of these verbs as causative based solely on its structure. Furthermore, the three verbs undergo decausativization, forming *hitxasel*, *nexrav* and *neheras* respectively. This strengthens the claim that they are all the same type of predicate, listed as basic entries in the lexicon. *hiCCiC* is indeed the unmarked causative binyan, but only for the ‘cause to do’ causatives, whose formation is generally regarded as causativization (Bolozky

²⁵ See Bolozky and Saad (1983) and Saad and Bolozky (1984) for discussion of the notions of agency, activity and causation with respect to the binyan system.

1982, Levin and Hovav-Rappaport 1995, Reinhart 2002, Horvath and Siloni 2010a). However, since this operation is not productive in MH, it is irrelevant to the present discussion.²⁶ Formation of ‘cause to do’ causatives is expected to use binyan *hiCCiC*. As for other new transitive verbs, their formation in a given binyan depends on a phonological consideration, to be discussed in 4.3.2.

MH *hitCaCeC* is used mainly for the formation of verbs that are outputs of syntactic valence-reducing operations. Out of 125 denominative verbs in *hitCaCeC*, 98 (78%) are derived in such operations. Most of them are derived from transitive verbs in *CiCeC*.

(31) *CiCeC* → *hitCaCeC* derivations in verb innovations

Base	Derived form
a. Transitive → decausative	
kimpel ‘compile’	hitkempel ‘become compiled’
kinfeg ‘configure’	hitkanfeg ‘undergo configuration’
xišmel ‘electrify’	hitxašmel ‘get electrified’
biʔes ‘depress’	hitbaʔes ‘become depressed’
b. Transitive → reflexive	
fikes ‘focus’	hitfakes ‘be in focus’
ciyed ‘equip’	hictayed ‘equip oneself’
b. Transitive → reciprocal	
cirfet ‘give a French kiss’	hictarfet ‘share a French kiss’

There are also verbs which are formed in *hitCaCeC* but have no transitive counterpart. Again, these verbs are mostly decausatives, reflexives and reciprocals. For example, the reciprocal verb *histoded* ‘talked discreetly to’ is formed based on the noun *sod* ‘secret’ but has no transitive counterpart in *CiCeC* (**soded*).²⁷ More examples are presented in (32).²⁸ The reader is reminded that that some instances are

²⁶ Bolozky (1982) provides examples like *hidhir* ‘make gallop’, which is indeed a ‘cause to do’ causative. Such examples were not found in my data.

²⁷ The first vowel of the verb is *o* and not *i* (**sided*) because the base (*sod* ‘secret’) contains the vowel *o*. The selection of a vocalic pattern in such cases is irrelevant for the purposes of this study as the binyan is the same. See Ussishkin (1999a, 2005) for an extensive discussion.

²⁸ Following Reinhart and Siloni (2005) and Horvath and Siloni (2008), I assume such verbs have a transitive alternate that is a frozen entry in the lexicon, namely an existing concept with no phonetic representation (see 5.3.2).

more common than others, yet they all illustrate the same reason for selecting *hitCaCeC*.

(32) Derived verbs formed directly in *hitCaCeC*²⁹

Base		Derived form	
a. Decausatives			
feyd	‘fade’	hitfayed	‘fade’
obsesya	‘obsession’	hitaʔabses	‘become obsessed’
šavac	‘stroke’	hištavec	‘suffer a stroke’
carud	‘hoarse’	hictared	‘become hoarse’
mastul	‘high (drugs)’	hitmastel	‘get high/stoned’
b. Reflexives			
yafyuf	‘gorgeous’	hityafyef	‘adorn oneself’
galxac	‘shaving and polishing’	hitgalxec	‘shave and polish one’s shoes’
xatix	‘handsome’	hitxatex	‘dress up’
ambatya	‘bath’	hitʔambet	‘take a bath’
meʔil	‘coat’	hitmaʔel	‘put on a coat’
c. Reciprocals			
pulmus	‘debate’	hitpalmes	‘argue with’
mišpat	‘trial, sentence’	hitmašpet	‘argue as two lawyers’
mekax	‘purchase’	hitmakeax	‘bargain’
yadid	‘friend’	hityaded	‘become friendly with’
meyl	‘mail’	hitmayel	‘get in touch by email’

The examples in (32) illustrate the status of *hitCaCeC* in new verb formation. The distinction between *CiCeC/hiCCiC* and *hitCaCeC* is based on the thematic status of the verbs in the lexicon, i.e. base versus derived entry. Bolozky (1978, 1999) refers to the *CiCeC–hitCaCeC* formations in terms of ‘focus on the agent’ and ‘focus on the theme’ respectively. If the focus is on the agent, speakers usually opt for *CiCeC*. If the focus is on the theme, *hitCaCeC* is chosen. However, Bolozky observes that the ‘focus on the theme’ choice also includes reflexive and reciprocal verbs. This is so because the theme and agent refer to the same entity in the case of reflexives and alternate in the case of reciprocals. In both kinds of verbs an agent is clearly present and the grammatical subject is also associated with the theme role. The distinction between base and derived entries captures the division of labor between the binyanim. Regardless of the operation in which *hitCaCeC* verbs are formed, they lose one argument and thus become syntactically reduced.

²⁹ When the first stem consonant of *hitCaCeC* verb is a strident, metathesis takes place, as in *hištavec* (**hitšavec*) ‘suffer a stroke’. This is irrelevant for the selection of binyan for denominative verbs (but see 5.2.3 for its relevance with respect to relations between existing forms).

A similar division of labor exists between the corresponding PA binyanim. There is a clear split between the two binyanim *CaCCaC* and *tCaCCaC*. Verbs that are basic entries are formed in *CaCCaC* (33). Out of 93 *CaCCaC* verbs, 92 (99%) are basic entries.

(33) Verb innovation in *CaCCaC* (PA)

Base		Derived verb	
sayn	‘sign’	sayyan	‘sign’
fōrmæt	‘format’	farmat	‘format’
breyk	‘brake’	barrak	‘apply brakes’
iks	‘X’	akkas	‘put an X on somebody’
ħaši:š	‘hashish’	ħaššaš	‘smoke hashish’
umma	‘nation’	ammam	‘nationalise’
milħ	‘salt’	mallah	‘add salt’

tCaCCaC, by contrast, is selected mostly for verbs derived by thematic operations (34). The transitive verb *makyaj* ‘put makeup on X’, for example, is formed in *CaCCaC*, while its derived reflexive counterpart, *tmakyaj* ‘put on makeup on oneself’ is formed in *tCaCCaC*. Out of 34 *tCaCCaC* verbs, 22 (65%) are derived verbs.

(34) Verb innovation in *tCaCCaC* (PA)

Base		Derived verb	
a. Decausatives			
nərvəs	‘nervous’	tnarvas	‘become nervous’
amrika	‘America’	tʔamrak	‘become Americanized’
markaz	‘center’	tmarkaz	‘become centralized’
armala	‘widow’	trammal	‘be widowed’
kahrabe	‘electricity’	tkahrab	get electrocuted’
hawa	‘air’	thawwa	‘get aired out’
dəprəs	‘depression’	(t)dabras	‘become depressed’
azme	‘crisis’	tʔazzam	‘reach a crisis’
ʔirq	‘root’	tʔarwaq	‘become rooted’
b. Reflexives			
ħija:b	‘veil’	tħaja:b	‘put on a veil’
kundara	‘shoe’	tkandar	‘put on a shoe’
badle	‘suit’	tbaddal	‘put on a suit’
juzda:n	‘wallet/purse’	tjazdan	‘use a wallet/purse’
kæžuəl	‘casual’	tkažwal	‘put on casual clothes’
ħinna	‘henna’	tħanna	‘henna one’s hair’
hištaxlel	‘become upgraded’	tšaxlal	‘upgrade oneself’
c. Reciprocals			
biznəs	‘business’	tbaznas	‘do business together’

As is the case for MH *hitCaCeC*, verbs that are output of valence-reducing operations are formed in *tCaCCaC* even if they have no transitive counterpart in *CaCCaC*. For example, the reciprocal verb *tbaznas* ‘do business together’ is derived from the English noun *business* but has no transitive counterpart (**baznas*). The forms of such verbs without transitive counterparts offer morphological evidence for the claim that some verbs are listed in the lexicon as basic entries while others are listed as sub-entries, namely as the output of thematic operations. The morphological mechanism selects a different binyan for verbs that are the output of valence changing, and by doing so it marks their different thematic status in the lexicon. This morphological distinction between based and derived entries enables a unified analysis for the division of labor among binyanim in both languages.

Onomatopoeic verbs are also formed in MH *CiCeC* (e.g. *zimzem* ‘hum’) and PA *CaCCaC* (e.g. *walwal* ‘howl’). This is so because they are basic entries in the lexicon as well and are not derived by thematic operations.

The reader is reminded that the above characteristics are tendencies rather than strict rules; there is no absolute division of labor among the binyanim. Thus, for instance, there is a group of derived verbs in the PA binyan *CaCCaC*, some of which are derived from homophonous transitive verbs (e.g. *ħajjar* ‘make/become stiff’). Nonetheless, there is a strong tendency for base verbs to be formed in certain binyanim, while derived entries are formed in others.

4.2.2. Semantic Field

The semantic field (Lyons 1977) with which a verb is affiliated may also affect the choice of binyan. Although this effect is minor relative to other criteria discussed here, it should not be ignored. *CaCaC* is uncommon for new verbs in both MH and PA because of the alternations in its prosodic structure, to be discussed in 4.3.1. Cases where it is selected seem to be motivated either by the binyan of verbs from the same semantic field, as discussed in what follows, or by faithfulness constraints that take into account the structure of the base, to be discussed in 4.3.2.

The selection of form in word formation may be influenced by semantic properties that do not concern the valence of the verb. For instance, McCarthy (1979, 1981) notes that in Biblical Hebrew, the verbal pattern of reduplication denotes intensification, while in MH, this pattern, which exists only in nouns and adjectives, designates a diminutive (Bolzky 1999, Graf 2002). Ussishkin (1999a, 2000) distinguishes between two verbal patterns of reduplication, claiming that one designates durative or repetitive meaning while the other is semantically neutral. The MH suffix */-on/* consistently appears in nouns denoting types of periodicals (e.g. *et* ‘time’- *iton* ‘newspaper’, *yerax* ‘month’ - *yarxon* ‘monthly newspaper’, *šavuʔa* ‘week’ *švuʔon* ‘weekly newspaper’). Bat-El (2006) claims that structural similarity between words belonging to the same semantic field does not necessarily indicate that it is the common structure that denotes this shared semantic property. She argues that a word occasionally takes the structure of another word in order to reflect some semantic affiliation that is not expressed by a shared base or by a semantically specified structure. The semantic property shared by the periodical examples is based on the generic word *iton* ‘newspaper’, rather than on the suffix *-on*. Thus, the word *yarxon* ‘monthly newspaper’, for instance, was formed with the *-on* suffix due to the similarity to *iton* ‘newspaper’. Speakers may select one form and not another based on analogy and semantic resemblance to other words.

Semantic resemblance also plays a role in the formation of new verbs. Verbs that belong to a specific semantic class sometimes occur in the same binyan, e.g. MH *CaCaC*, for verbs denoting sleeping: *yašan*, *nam* ‘sleep’, *nax* ‘rest’. Two relatively new MH verbs that denote sleeping are formed in *CaCaC*: *xarap* ‘sleep deeply’ and *šanac* ‘take a noon nap’. The former is based on the noun *xrop* ‘nap’ and the latter is derived from the acronym word *šnac* (= *šnat cohorayim*) ‘noon nap’. The choice of *CaCaC* is very unusual in verb innovation. I suggest that the reason for that is the fact that these verbs belong to the class of ‘sleeping’ verbs (*yašan*, *nam* ‘sleep’ and *nax* ‘rest’), which appear in *CaCaC* (but see 4.3.2.2 where I show that such or this? selection can also be motivated by morpho-phonology).

There are MH verbs denoting ‘act like X’, where X is an adjective or noun, which are formed in *hitCaCeC*. This is relatively unusual, as the *hitCaCeC* verbs in (35) are not derived by valence changing operations, and most new *hitCaCeC* verbs are derived ones (see 4.2.1).

(35) MH *hitCaCeC* ‘act like’ verbs

Base		Derived verb	
xole	‘sick’	hitxala	‘pretend to be sick’
axzar	‘cruel’	hitʔaxzer	‘act cruelly’
navi	‘prophet’	hitnabe	‘prophesify’
aclan	‘lazy’	hitʔacel	‘be lazy’
aluka	‘leech’	hitʔalek	‘act like a leech’
misken	‘miserable, poor’	hitmasken	‘pretend to be miserable’
xazir	‘pig’	hitxazer	‘eat like a pig’

The same pattern also exists in PA, where *tCa:CaC* and *tCaCCaC* are used for the formation of verbs denoting ‘act like X’ and do not result from thematic operations (36).

(36) PA *tCa:CaC/tCaCCaC* ‘act like’ verbs

Base		Derived verb	
falsafe	‘philosophy’	tfalsaf	‘philosophise’
baxi:l	‘parsimonious’	tba:xal	‘behave parsimoniously’
fadʔl	‘gesture’	tfadʔdʔal	‘be kind to’
kasla:n	‘lazy’	tkaslan	‘be lazy’
ra:s	‘head’	traʔʔas	‘head, chair, be in charge’
ša:tʔer	‘smart’	tša:tʔar	‘be a wise guy’
ahbal	‘stupid’	tha:bal	‘pretend to be stupid’

Semantic resemblance plays a relatively minor role in binyan selection compared to the base vs. derived criterion and the morpho-phonological properties of the binyanim (as will be clear in 4.3). However, there are cases where it dictates the selection of an atypical binyan. The fact that verbs denoting ‘act like’ are consistently formed in the same binyan in both languages suggests that the selection of binyan in this case is not accidental.

4.2.3. Interim Summary

So far I have shown that the selection of binyan in verb innovation is primarily based on the distinction between verbs that are basic entries in the lexicon and verbs that are derived forms like decausatives, reflexives and reciprocals. In addition, there are also some marginal cases in which the semantic field to which the entry belongs brings about the selection of less typical binyanim. As already noted by Bolozky (1986:39), innovators tend to reselect certain tendencies associated with the binyanim, since innovators look for transparent generalizations in word-formation processes. The data I have examined support this claim with respect to both languages. The next section addresses the morpho-phonological dimension of binyan selection.

4.3. Morpho-phonological Criteria

Morpho-phonological criteria determine which binyanim are not active in the formation of new verbs, and which of the active binyanim are selected in accordance with the thematic-semantic criteria discussed in 4.2. For example, they dictate to a great extent which MH basic entries are formed in *CiCeC* and which ones are formed in *hiCCiC* (Bolozky 1978, 1999). I view the interaction among the criteria in the spirit of Optimality Theory (Prince and Smolensky 1993), which accounts for variation in terms of different rankings of competing constraints. Several of these morpho-phonological constraints favor the selection of one binyan over another. Specifically, I contend that markedness and faithfulness constraints both contribute to binyan selection.

4.3.1. Prosodic Structure and Markedness

Markedness constraints concern universal markedness and are stated either to conform to phonetic observations or in keeping with cross-linguistic typological data. When satisfied, markedness constraints cause marked structures to be repressed. The term *markedness* has received a great deal of attention and many definitions within the linguistic literature (see, for example, Mayerthaler 1981, Dressler et al. 1987, Wurzel 1998, 2000, Faingold 2003, de Lacy 2006, Flack 2007, see also Haspelmath 2006 for a

discussion of the term). In this study, I use the term only as it applies to the morphological complexity of the prosodic structure of some binyanim.

The binyanim *niCCaC* (MH) and *CaCaC* (MH and PA) are considered prosodically more marked than others because their prosodic structure alternates within their inflectional paradigm (Schwarzwald 1996, Bat-El 2001). In contrast to the rest of the binyanim in both languages, they do not preserve their syllabic structure throughout their inflectional paradigms. Examine first the prosodic structure of the unmarked MH binyanim in (34). As shown, all forms in the inflectional paradigms of *CiCeC* and *hitCaCeC* share a CVCVC stem (e.g. *kines* ‘assemble’), with the addition of a prefix in some of the conjugations (e.g. *yekanes* ‘assemble-Fut.’). All forms in the *hiCCiC* paradigm share the syllabic structure *CCVC* in addition to the binyan's prefix *hi-*. The first and second stem consonants (*x* and *n* in the example in (37)) are adjacent throughout the paradigm. Whether the inflectional paradigms of the binyanim in (37) include a consonant cluster or not, the same syllabic structure remains intact throughout the entire paradigm. This uniformity of the prosodic structure makes the morphology of these three binyanim highly transparent, as the transition from one tense to the other involves no change in the internal prosodic structure. The only changes that occur are the addition of a prefix and sometimes a change to some of the vowels (e.g. *kines- lekane*s in the *CiCeC* paradigm).

(37) MH uniform inflectional paradigms

	CiCeC	hitCaCeC	hiCCiC
Past	kines	hitkanes	hixnis
Present	mekanes	mitkanes	maxnis
Future	yekanes	yitkanes	yaxnis
Infinitive	lekanes	lehitkanes	lehaxnix
	‘assemble’	‘gather’	‘bring in’

The same uniformity exists in all PA binyanim apart from *CaCaC* (38).

(38) PA uniform inflectional paradigms

	CaCCaC	Ca:CaC	aCCaC	tCaCCaC	inCaCaC	istaCCaC
Past	rattab	sa:far	akram	tʃallam	inkasar	istaʃmal
Present	mratteb	msa:fer	mikrem	mitʃallem	minkeser	mistaʃmel
Future	iratteb	isa:fer	yikrem	yitʃallam	yinkeser	yistaʃmel
	'arrange'	'travel'	'respect'	'study'	'break'	'use'

This uniformity and transparency of prosodic structure does not exist in the inflectional paradigms of *CaCaC* (MH and PA) and *niCCaC* (MH). As shown in (39) below, the prosodic structure of the past and present forms in these binyanim is different from those in the future and infinitive forms. In *CaCaC*, the past and present forms share a CVCVC structure with no consonant cluster (e.g. *sagar* 'close'), while the future and infinitive forms share a CCVC structure preceded by a prefix, where a consonant cluster emerges (e.g. *yisgor* 'close-Fut.).³⁰

A mirror image of such alternation is found in the *niCCaC* paradigm, whose past and present forms contain a cluster of the first two stem consonants (e.g. *nisgar* 'be closed'), but not in the future and infinitive (e.g. *yisager* 'be closed-Fut.').

(39) Non-uniform inflectional paradigms

	CaCaC (PA)	CaCaC (MH)	niCCaC (MH)
Past	sakan	sagar	nisgar
Present	sa:ken	soger	nisgar
Future	yuskun	yisgor	yisager
Infinitive	-----	lisgor	lehisager
	'live'	'close'	'be/get closed'

The prosodic alternation makes *CaCaC* and *niCCaC* morphologically more complex and less transparent than other binyanim. This results in a phonological load expressed by prosodic shifting (Bat-El 2002), so that *CaCaC* and *niCCaC* can be defined as the paradigmatically most marked binyanim in prosodic structure.

³⁰ Some forms in the past inflectional paradigm do consist of a cluster. This happens due to vowel deletion when a vowel initial suffix is attached to the stem (e.g. *sagar-a* → *sagra* 'she closed'). However, the base of the past form that is free of affixes does not consist of a consonant cluster. In this study, I relate only to the bear stems in each tense, prior to their inflection in the syntax.

How is the complexity of the prosodic structure of *CaCaC* and *niCCaC* relevant to the formation of denominative verbs? Because of their non-uniform inflectional paradigms, *CaCaC* is used very infrequently for the formation of new verbs entering both languages, and *niCCaC* is not used at all.³¹ Denominative verbs are mostly formed in *CiCeC*, *hitCaCeC* and *hiCCiC* in MH, and in *CaCCaC* and *tCaCCaC* in PA (see Bolozky 1978, 1986, 1999, Schwarzwald 1981a, Nir 1993, Bat-El 1994, Berman 2003, Laks 2007b among many others). Studies of children's verb-innovations reveal the same picture, with *CaCaC* and *niCCaC* are used mainly for existing forms, and rarely in innovations, whereas *CiCeC*, *hitCaCeC*, and *hiCCiC* serve both for existing and new forms (Berman 1987, 1993, 2000, 2003, Berman and Sagi 1981).

Among other binyanim in both languages *CiCeC* in MH and *CaCCaC* in PA are the most unmarked binyanim because they are the only ones that do not have a prefix. Consequently, they are used as a default for new verbs that are basic entries in the lexicon. Verbs that are derived entries are formed in *hitCaCeC* (MH) and *tCaCCaC* (PA), as discussed in 4.2.1.

In addition, *CiCeC* and *hitCaCeC* in MH and *CaCCaC* and *tCaCCaC* in PA are used almost exclusively for verbs with more than three stem consonants. Other binyanim do not host such verbs since their prosodic structure does not allow them to do so.³² Out of 531 examples of MH denominative verbs, 353 (66%) verbs were formed in *CiCeC* and 125 (24%) were formed in *hitCaCeC*. Verb formations in both binyanim together constitute 90% of cases of MH verb innovation. Out of 134 examples of PA denominative verbs, 93 (70%) were formed in *CaCCaC* and 34 (25%) were formed in *tCaCCaC*, constituting together 95% of the new verbs.

³¹ See 4.3.2.2 for the discussion of rare cases where *CaCaC* is selected for verb formation due to faithfulness to the prosodic structure and the vocalic pattern of the base.

³² I do not distinguish in this section (4.3) between *CiCeC* and *hitCaCeC* in MH or between *CaCCaC* and *tCaCCaC* in PA since the division of labor within each of these pairs is based on thematic-semantic considerations. Most of the examples are *CiCeC* and *CaCCaC* verbs because these binyanim are the default for verbs that are basic entries (and not derived by valence changing).

(40) Quadriliteral PA verbs

Base		Derived Verb	
format	'format'	farmat	'format'
kænsel	'cancel'	kansal	'cancel'
servis	'service'	sarvas	'provide service'
dipres	'depress'	dabras	'make X depressed'
senter	'center'	santar	'centralize'
formyælə	'formula'	farmal	'formulize'
šifšef	'rub'	šafšaf	'rub'
teləfon	'telephone'	talfan	'telephone'

(41) Quadriliteral MH verbs

Base		Derived Verb	
formæt	'format'	firmet	'format'
kænsəl	'cancel'	kinsel	'cancel'
tafkid	'function'	tifked	'function'
bardak	'mess'	birdek	'make mess'
trənsfər	'transfer'	trinsfer	'transfer'
teləfon	'telephone'	tilfen	'telephone'

The *CiCeC-hitCaCeC* (MH) and *CaCCaC-tCaCCaC* (PA) paradigms are therefore regarded as the default derivational paradigms for the formation of new verbs.

In cases where the base for verb formation is monosyllabic or contains only two stem consonants, the template is satisfied by either glide insertion (42a, 43a) or reduplication (42b, 43b) (Bolozky 1978, Bat-El 1989, 1994, 2005b, Gafos 1998, Ussishkin 1999a, 1999b, 2000, Tobin 2001, Schwarzwald 2004, 2010); rarely, the stems is presented as is (e.g. *mapa* 'map' → *mipa* 'to map'). I do not discuss the criteria for choosing among the different strategies, since the object of study here is binyan selection. In all these cases, the most unmarked binyanim are selected and the morphological mechanism adopts one of these strategies to satisfy templatic constraints on verb formation (McCarthy 1979, 1981, McCarthy and Prince 1986, 1993, 1995).

(42) PA verbs based on two stem consonants

Base		Derived Verb	
a. glide insertion			
ze:t	'oil'	zayyat	'oil'
lifa	'sponge gourd'	layyaf	'scrub'
ček	'check'	šayyak	'check (in a checkbox)'
kæš	'cash'	kayyaš	'cash a check'

Base		Derived Verb	
bo:l	'urine'	bawwal	'urinate'
tabu	'land registry office'	tawwab	'register'
b. reduplication			
ful	'full'	fallal	'fill up (patrol)'
tʰæp	'tap'	tʰabtʰab	'tap'
zirr	'button'	zarrar	'button'
umma	'nation'	ammam	'nationalis'
uf	'Ugh!'	tʰafʰaf	'sigh, say oof'

(43) MH verbs based on two stem consonants

Base		Derived Verb	
a. glide insertion			
bul	'stamp'	biyel	'put a stamp'
šem	'name'	šiyem	'give X a name'
tik	'file'	tiyek	'put in a file'
b. reduplication			
daf	'page'	difdef	'turn a page'
bis	'bite'	bisbes	'take many bites'
zap	'zap'	zipzep	'zap'
dak	'thin'	dikek	'make thin'
lap	'lap'	lipep	'sit on X's lap'
boc	'mud'	hitbocec	'get dirty with mud'

4.3.2. Faithfulness Constraints

Verb formation is also affected by faithfulness constraints, which require identity across various forms within a paradigm, specifically between a base and its derived verb. Such constraints therefore penalize any change, including deletion, epenthesis and stress shift.

4.3.2.1 Initial cluster preservation: *CiCeC* vs. *hiCCiC*

The choice between MH *CiCeC* and *hiCCiC* in verb innovation is based on faithfulness to the base from which the verb is derived. As noted, both binyanim host new verbs, which are basic entries in the lexicon. How does the morphological component choose between the two? There are cases where *hiCCiC* is selected for the formation of basic entries. This happens mainly with verbs whose base is a monosyllabic word that begins with a consonant cluster (Boložky 1978, 1999, 2002, 2005, Bat-El 1994).³³ When forming a new verb, speakers aim at faithfulness to the base form not only with regard to the order of segments in the base, but also with

³³ See Schwarzwald (2005) and Boložky (2006) for the discussion of initial clusters in MH in general.

respect to their prosodic position. When the base contains a consonant cluster in word initial position, its derived verb should also retain the cluster structure. As shown in (44), the formation of the MH verb *hiklik* ‘click on a computer mouse’, based on the word ‘click’, allows the initial cluster /kl/ of the base to remain intact throughout the entire inflectional paradigm. Forming this verb in any of the other binyanim, e.g. *CiCeC* or *CaCaC*, would break the cluster in at least some places, thereby forming a structure that would be less faithful to the base.³⁴

(44) Faithful and unfaithful formation of MH denominative verb ‘click’

	hiCCaC	CiCeC	CaCaC
Past	hiklik	*kilek	*kalak
Present	maklik	*mekalek	*kolek
Future	yaklik	*yekalek	*yiklok
Infinitive	lehaklik	*lekalek	*liklok

The examples I collected indicate that the selection of *hiCCiC* in new verb formation is mostly restricted to cases where the base contains an initial consonant cluster. Out of 41 instances of verb innovation in *hiCCiC*, 27 (66%) are cases where the base contains such a cluster. Forming the verbs listed in (45) in *hiCCiC* allows the cluster to be preserved.

(45) Verb innovation in *hiCCiC* (MH)

Base		Derived verb	
klik	‘click’	hiklik	‘click’
kræš	‘crash’	hikriš	‘crash an application’
snif	‘a sniff’	hisnif	‘sniff’
flik	‘a spank’	hiflik	‘spank’
switč	‘switch’	hiswič	‘switch’
spam	‘spam’	hispim	‘send a spam’
stres	‘stress’	histris	‘cause stress’
šnac	‘a noon nap’	hišnic	‘take a noon nap’
špric	‘a squirt’	hišpric	‘squirt’
švic	‘a brag’	hišvic	‘brag’
flaš	‘flush’	hifliš	‘flush down the toilet’

³⁴ The cluster could be preserved at the cost of reduplication of the last consonant (*klikek), similarly to *flirtet* ‘flirt’. The formation in *hiCCiC* keeps the verb faithful to the base and there is no need to apply further processes.

Note that this constraint, as well as others, reflects strong tendencies of the morpho-phonology in the lexicon. It does not preclude entirely the formation of verbs in *hiCCiC* that do not have an initial cluster, e.g. *hisrit* ‘film’, derived from the MH noun *seret* ‘film’. There are also bases with initial clusters that have a derived verb in *CiCeC*, e.g. *bilef* ‘bluff’, derived from the noun *blof* ‘a bluff’ (see also 4.3.2.2). The examples in (45) also show that the distinction between *CiCeC* and *hiCCiC* in new verb formation is purely morpho-phonological and not thematic. *CiCeC* is the default binyan for transitive verbs that enter the language, while *hiCCiC* is selected for transitive verbs to preserve a consonant cluster when one is present in initial position in the base.

The situation is different in PA. When the base consists of an initial consonant cluster, *CaCCaC* is selected and the cluster is not preserved (46).

(46) PA innovation based on words with initial clusters

Base		Derived verb	
krem	‘cream’	karram / *akram	‘use cream’
sya:j	‘fence’	sayyaj / *asyaj	‘fence’
fri:z	‘freeze’	farraz / *afraz	‘freeze’

aCCaC could just as easily have been selected for the verbs in (46). Selecting it would yield *akram*, to give one example, thereby preserving the consonant cluster of the noun *krem* ‘cream’. This result would parallel the selection of *hiCCiC* in MH. But PA and MH apply different strategies for binyan selection when the base form contains an initial cluster. Why should this be so? I contend that PA *aCCaC* is not active in the formation of new verbs as a result of its low frequency among existing forms, in contrast to MH *hiCCiC*. A dictionary search reveals only 75 *aCCaC* verbs, which represents only 3.5% of all PA verbs. In addition, verbs that do occur in this binyan have low token frequency (see Rosenhouse 2002). There are verbs that are formed in both *CaCCaC* and *aCCaC* with no difference in meaning (47) (see also Chapter 6 for an extensive discussion of morphological variation).

(47) *aCCaC* – *CaCCaC* alternations (PA)

MSA	PA	
atlaʕ	tallaʕ	'take out'
adʕaf	dʕaʕʕaf	'weaken X'
arjaʕ	rajjaʕ	'give back'

Both *dʕaʕʕaf* and *adʕaf*, for example, denote 'weaken X', but *dʕaʕʕaf* is used almost exclusively. The low frequency of *aCCaC* leads speakers to avoid it in the formation of new verbs. Various studies point at the importance of frequency effects in language development and change, and specifically in word formation (Gordon 1983, Luce and Pisoni 1998, Alegre and Gordon 1999, Long and Almor 2000, Bolozky 2001, 2003 Bybee 2001, 2002, 2004, 2006, Skousen 1989, Albright and Hayes 2002, Ernestus and Baayen 2003, Ussishkin and Wedel 2002, 2009, among many others).

4.3.2.2 *Template and vowel preservation: CaCaC innovations*

Binyan *CaCaC* is considered highly marked because of alternations in prosodic structure throughout its inflectional paradigm, and it is therefore not productive in verb innovation in either MH or PA. However, there are a few cases in both languages where *CaCaC* is selected for the formation of new verbs. Examining the small set of such examples reveals that this binyan is selected due to faithfulness constraints to the vocalic pattern and prosodic structure of the base, in a manner similar to the selection of MH *hiCCiC* discussed in 4.3.2.1 (Schwarzwald 2000). This happens when the base for verb formation resembles in its prosodic structure and vowel quality existing verb forms within the language. The selection of *CaCaC* occurs mainly with words whose structure resembles one of the defective verbs, whose stem consonants do not appear consistently throughout their inflectional paradigms. Take, for example, MH monosyllabic verbs with only two stem consonants (48). The past and present forms of such verbs share the template *CaC*, and their future forms consist of a prefix and a stem with the template *CuC* or *CiC*.

(48) MH monosyllabic defective verbs (*CaC*)

Past/Present (<i>CaC</i>)	Future (<i>yaCuC/yaCiC</i>)	
rac	yaruc	'run'
kam	yakum	'get up'
sam	yasim	'put'
šar	yašir	'sing'

Monosyllabic words that serve as the basis for verb formation fit into the template of the verbs in (48), so *CaCaC* is selected. Examine, for example, the future verb *yamuv* 'will move' which is derived from the English monosyllabic verb 'move'. In order to form such a verb, all the morphological mechanism has to do is agglutinate the future prefix /*ya-*/ to the base form. As a result, the prosodic structure of the new verb is faithful to the base. In this case even the vowels of the base and the derived verb are relatively close. When the base consists of the vowel *u*, the morphological mechanism selects a template that has the most similar vowel available in the phonetic inventory of the language. In the example in (49), the English verb *bid* serves as the base for verb formation in the future form, as well. In this case the base consists of the vowel *i*, hence the selected template is the one seen in forms like *tašir* 'will sing', since it consists of a similar vowel /*i*/. The result, in second person singular, is the verb *tabid*.

(49) lifney še-ata kone **tabid**

'before you buy, bid'

(123.bid.co.il)

The same pattern occurs in PA with defective monosyllabic *CaCaC* forms, whose structure is also faithful to the base from which verbs are derived. The verb *yezu:m* 'will zoom in' is derived from the English verb 'zoom'. Again, the base is monosyllabic and it contains the vowel *u*. As such, it resembles existing PA verbs like *yequ:l* 'will say' (50). Forming such verb in *CaCCaC*, which is the most productive binyan for verb innovation, would involve glide insertion or reduplication of the stem consonant(s) in order to fill the consonant slots of the binyan (see (42)). This would

yield verbs like **zawwam/*zammam/*zamzam* ‘zoom’, which would not be faithful to the base.

(50) PA monosyllabic defective verbs

Past Ca:C)	Future (yeCu:C/yeCi:C)	
qa:l	yequ:l	‘say’
ra:h̄	yeru:h̄	‘get up’
ʔaš	yeʔi:š	‘live’
sʔa:r	yesʔi:r	‘happen’

More examples of PA *CaCaC* formations are presented in (51).

(51) PA verb innovation in *CaCaC*

Base	Derived Verb	Parallel PA verb
ful ‘full’	ful ‘fill the whole tank (fuel)’	qul ‘say!’
zum ‘zoom’	azum ‘I zoom’	aqu:l ‘I say’
pejo ‘Peujot’	bajet ‘I drove a Peujot’	banet ‘I built’
ešmor ‘I will guard’	ašmur ‘I will guard’	aktub ‘I write’

Each of the verbs in (51) also demonstrates faithfulness to some existing form in PA. Forms such as *bajet* ‘I drove a Peujot’ share the same template as existing verbs like *laqet* ‘I met’. The verb *ašmur* ‘I will guard’, which is derived from the MH verb *ešmor*, preserves the consonant cluster in the base form and is therefore faithful to the base. Finally, the imperative form *ful* ‘fill the whole tank with fuel’ is identical in its prosodic structure to PA hollow imperative verbs such as *qul* ‘say’ and *ruḥ* ‘go’.³⁵ Here again, selecting *CaCaC* ensures faithfulness.³⁶ Such cases provide further evidence for word-based approaches (Aronoff 1976, 2007, Steriade 1988, Aronoff and Fudeman 2005, Blevins 2006, among others) by showing that the properties of the base are taken into consideration in the formation of derived forms (Bat-El 1994, 2002, Ussishkin 1999a, 2000, 2005).

³⁵ Such *CaCaC* innovation might be used only in a specific tense and would not be fully conjugated as verbs in the language. The PA verb *ful* ‘fill the whole tank with fuel’, for example might not be used in the past form (e.g. **fal*, so far I have not come across such examples), but only in the imperative form, where it is structurally similar to the base.

³⁶ Similar patterns are found in the cognate curse in the Bedouin dialect of the Negev (Henkin 2009, 2010). The punning cognate curse patterns in adjacency pairs where an utterance triggers a punning curse. For example, the MH word *šuk* ‘market’ triggers the curse *yšukk iʔsʔa:bak* ‘may he (God) grate your nerves!’. Again, the syllabic structure and the vowel of the base are preserved in verb formation. See Henkin (2009) for more examples.

Currently, there are only a handful of instances where new verbs are formed in *CaCaC* in either language. Examining the process of binyan selection certainly does not lead to the prediction that each time the base resembles the structure of one of the forms in a binyan the new verb will be formed in that binyan. There are counterexamples that show otherwise. The MH noun *blof* ‘a bluff’ is expected to have a derived counterpart in *CaCaC* (or *hiCCiC*), as its future form would preserve the structure of the base (*yiblof* ‘will bluff’) and it would fit the template of other existing verbs (*yišmor* ‘will guard’). Still, *CiCeC*, which is the default binyan in MH verb formation, is selected rather than *CaCaC*. Nonetheless, the selection of *CaCaC* is not accidental and it is always motivated by morpho-phonology, specifically by a faithfulness constraint that requires the derived verb to reflect the base and its properties to as great an extent as possible.

Section 4.3 discussed the morpho-phonological factors that influence the selection of binyan in verb innovation. Each of the languages under study contains a pair of binyanim that are the most active in verb innovation because of their prosodic structure. These are considered the unmarked, default binyanim. Considerations of faithfulness to the base cause the selection of other binyanim like MH *hiCCiC* in some cases, and, in rare cases, of MH and PA *CaCaC*. Furthermore, the morphological component selects only binyanim that occur frequently enough among existing forms and are therefore accessible to speakers.

4.4. Summary

This chapter provides insights into the distribution of MH and PA binyanim and their productivity in verb innovation. The data I have examined reveals a drastic restriction on the productivity of some binyanim in verb formation in both languages.

In MH, *CiCeC*, *hitCaCeC* and *hiCCiC* are selected almost exclusively for morpho-phonological reasons, namely because there is no prosodic alternation in their inflectional paradigms. The choice between *CiCeC* and *hiCCiC* is based on a faithfulness constraint. *hiCCiC* is selected when the base consist of an initial

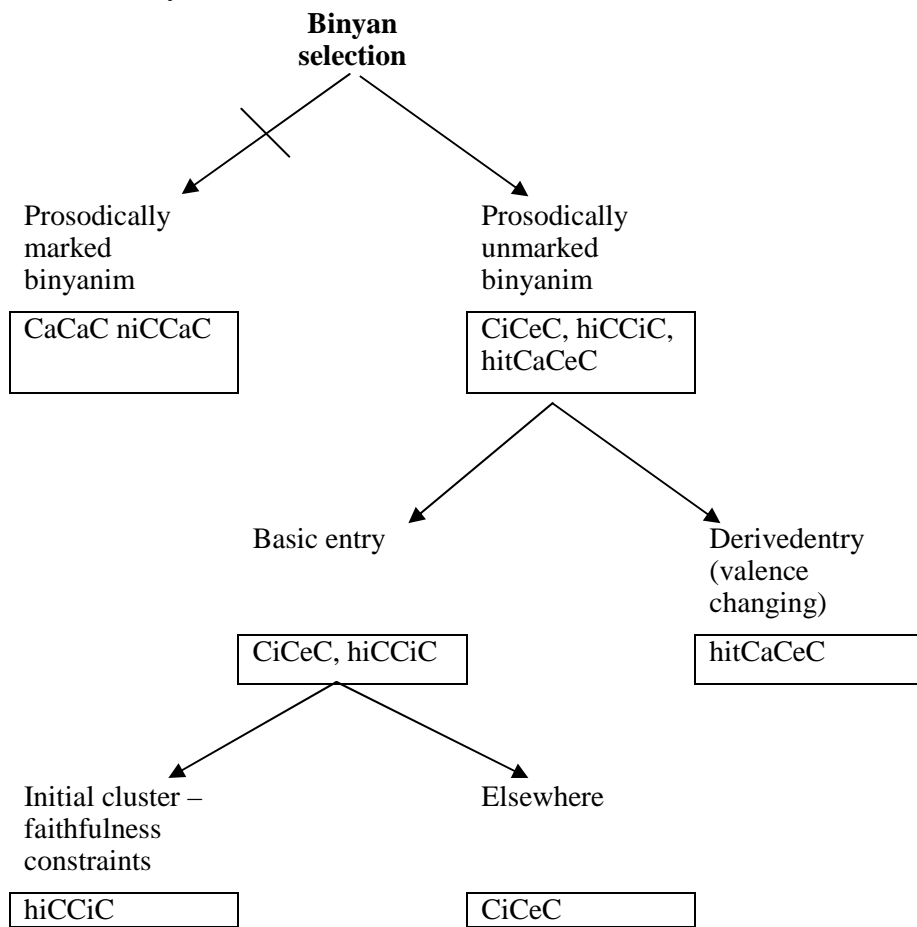
consonant cluster that must be preserved. *hitCaCeC* is selected for thematic-semantic reasons when the verb results from valence changing or, in rare cases, because of semantic resemblance to existing forms.

In PA, the system has been reduced to two main binyanim, *CaCCaC* and *tCaCCaC*, that are active in the formation of new verbs. The selection of these two binyanim over others results from morpho-phonological constraints. These binyanim are the only ones that can host more than three stem consonants, and there is no alternation in prosodic structure within their inflectional paradigms. Other binyanim with no such alternations occur infrequently among existing forms, and they cannot host more than three stem consonants. The division of labor between *CaCCaC* and *tCaCCaC* is based on thematic-semantic considerations. *CaCCaC* is used as the default binyan for basic entries, while *tCaCCaC* is used for derived ones either when the verb is the output of valence changing or when semantic resemblance is a factor.

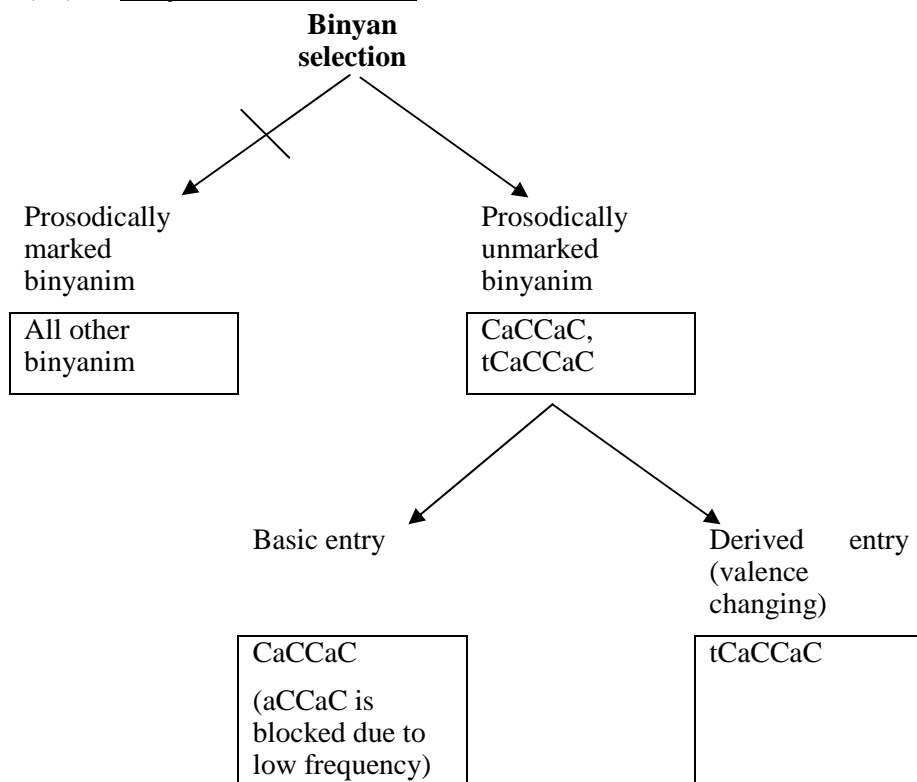
In both languages, *CaCaC* occurs frequently among existing forms but is rarely selected for the formation of new verbs. This is so because of the prosodic alternations that occur in its inflectional paradigms. However, I have shown that there are cases where this binyan is used for verb innovation and that such cases are not accidental. They arise mainly as the result of a faithfulness constraint that demands structural similarity to the base form, and sometimes as a result of semantic resemblance to the base. The interaction between the main factors that determine binyan selection in verb innovation is summarized in (52) for MH and in (53) for PA.³⁷

³⁷ The rare cases of *CaCaC* selection in both languages are not included in (52) and (53).

(52) Binyan selection in MH



(53) Binyan selection in PA



The analysis uncovers the interaction between morpho-phonological and thematic-semantic criteria in verb new formation. The study of binyan selection provides the linguist with a window of opportunity to observe the process of word formation in the lexicon, where both types of criteria are taken into consideration. The results of the study support the existence of an interface between morpho-phonology and the lexicon. More specifically, they support the conception of the lexicon as an active component in morphological formation of words (Aronoff 1976). In addition, they lend support to a word-based approach: in binyan selection, morpho-phonological features of the entire word are taken into account in addition to the thematic-semantic information that is coded in the concept. Specifically, such criteria are taken into account with respect to paradigms of words. The morphological mechanism evaluates features of the input and output of word formation with respect to other existing words within the relevant paradigm.

Chapter 5. Relations between Existing Forms

This chapter examines the relationships between the binyanim of existing forms with regard to the five valence-changing operations that are addressed in this dissertation. I examine the criteria for binyan selection for verbs that are derived via one of these operations and show what the typical thematic relations between the binyanim are.

The chapter is organized as follows. Section 5.1 provides a description of the typical binyanim for each operation in MH and PA. This is based on a search of The Sapphire dictionary (Avenyon 1997) for MH and The Olive Tree Dictionary (Elihay 2005) for PA.³⁸ Verbs were classified according to their thematic types with respect to the operations discussed in this study.

In section 5.2 I address cases in which some binyanim compete to host a derived form. I show that, while in some such cases the choice is random, there are also instances where the selection of one binyan over the other can be accounted on morpho-phonological grounds. Specifically, I contend that the selection of MH *niCCaC* over *hitCaCeC* in the formation of derived entries is motivated by morpho-phonological faithfulness constraints that aim to keep the derived forms as faithful as possible to the base forms, as shown in 4.3.2 for the selection of binyan in verb innovation, and thus repress the application of phonological processes such as consonant deletion and metathesis.

In section 5.3 I examine apparent mismatches between the form expected given the valence changing operation the verb has undergone and the form it in fact has. Specifically, in these cases the thematic relation between two forms of the same verb indicates that one was derived from the other, but their morphology indicates that the derivation took place in the opposite direction. To address these occurrences I rely on (i) the notion of frozen lexical entries, that is, entries unable to surface as actual words (see 5.3), and (ii) the historical relationships between the relevant forms. rely on the

³⁸ The Olive Tree Dictionary is based on sampling of urban PA spoken in Isreal and Palestine. Though there are differences between speakers from different cities, they are irrelevant with respect to binyan selection.

notion of frozen lexical entries and on the historical relationships between the relevant forms. I argue that while form A is indeed thematically derived from B, B pre-existed A in the lexicon but was present only as a frozen entry so that A entered the vocabulary first and was used for the morphological realization of B when B was later defrosted.

5.1. Relationships between Binyanim

Each type of valence-changing operation has a typical morphological manifestation, i.e., for each operation there is a pair of binyanim, one of which hosts the base and the other the derived form (Berman 1978, Bolozky 1978, Schwarzwald 1981b). In addition, there are verbs that have the properties of a derived verb, although they do not have a basic counterpart. I assume such verbs are stored in the lexicon as derived entries, where their base exists as a concept without structure. It is this concept that serves as a base for the valence changing operation (Reinhart and Siloni 2005, Horvath and Siloni 2008, see 5.3). Derived verbs with only conceptual counterpart are also formed in binyanim which are typical for derived entries. This shows that the morphological component identifies them as derived entries and selects the appropriate binyan for their formation. This subsection examines the pairs of binyanim that are typical for the five operations discussed in the dissertation: decausativization, causativization, reflexivization, reciprocalization and passivization. In addition, this subsection shows that some binyanim tend to be used in case of derivational relations more than others regardless of the type of specific thematic operation. This means that a particular binyan is the usual mate of another binyan. PA *tCaCCaC*, for example, is the usual mate of *CaCCaC*, and not *CaCaC*, as I will show, the *CaCCaC* - *tCaCCaC* paradigm is much more common in existing forms than the *CaCaC* - *tCaCCaC* paradigm.

5.1.1. Decausativization

Decausativization is an operation in which a cause role is reduced from the thematic grid of a verb. (54a) contains the MH transitive verb *kilkel* 'spoil', formed in *CiCeC*,

which assigns a cause role to the heat and a patient role to the soup. (54b) contains the decausative counterpart *hitkalkel* ‘become spoiled’, which is formed in *hitCaCeC* and assigns only the patient role (again to the soup).

- (54) a. ha-xom kilkel et ha-marak
 ‘The heat spoiled the soup’
 b. ha-marak hitkalkel
 ‘The soup spoiled’

As will be seen below, the morphology of decausativization is relatively less predictable than that of other thematic operations. There are various different pairs of binyanim that can be involved in the transitive-decausative alternation. Nonetheless, the majority of decausatives are formed either in *hitCaCeC* or *niCCaC*. (55) summarizes the results of the Sapphire dictionary search. Note that the terms ‘simplex’ and ‘complex’ in (55), as well as in the next sets of data, relate to the morphological relation between binyanim in each derivation. A binyan is classified as complex when it contains an additional element (e.g. a prefix or a geminate) in comparison to another binyan.

(55) MH decausativization paradigms

Formation			Percentage		Example		
a. simplex to complex	CiCeC	→	hitCaCeC	190	(49%)	kimet ‘wrinkle’	hitkamet ‘become wrinkled’
	CaCaC	→	niCCaC	46	(12%)	šavar ‘break’	nišbar ‘get broken’
	CiCeC	→	niCCaC	7	(2%)	xilec ‘extract’	nexlac ‘become extracted’
b. complex to complex	hiCCiC	→	hitCaCeC	23	(6%)	hirciz ‘make mad’	hitragez ‘get mad’
	hiCCiC	→	niCCaC	40	(10%)	hirdim ‘put to sleep’	nirdam ‘fall asleep’
c. simplex to simplex	CiCeC	→	CaCaC	4	(1%)	simeax ‘make happy’	samax ‘be(come) happy’
d. zero morphology	hiCCiC	→	hiCCiC	34	(9%)	hivri ‘make healthy’	hivri ‘become healthy’
e. complex to simplex	hiCCiC	→	CaCaC	44	(11%)	hikpi ‘freeze’	kafa ‘become frozen’
Total				388	(100%)		

As is clear from (55), the most common pattern for decausativization in MH is the simplex-to-complex formation, where the transitive verb is formed in a simplex binyan while its decausative counterpart is formed in a complex, marked binyan (55a): 63% of the cases are of this pattern. This correlates with the thematic analysis adopted in this study, where a decausative is derived from a transitive. There also exist complex-to-complex derivations where both basic and derived forms are morphologically marked (55b), as well as rare cases of simplex-to-simplex derivations where both forms are morphologically neutral (55c). In addition, there are patterns exhibiting zero morphology: the basic and derived forms are morphologically identical and tend to be formed in the morphologically marked binyan *hiCCiC* (55d). The complex-to-complex and simplex-to-simplex cases, as well as the zero morphology cases, cannot provide any evidence with regard to direction of application of the thematic operation, as the two forms in these pairs are either both marked or both unmarked.³⁹

The intriguing case is the complex-to-simplex derivation (55e), where the basic transitive entry is formed in a morphologically complex binyan (*hiCCiC*), while its decausative alternate is formed in a simplex binyan (*CaCaC*). Although, there are relatively few instances of the kind, this pattern is unexpected. Section 5.3 provides an explanation to these.

PA decausativization demonstrates three main paradigms of verb formation. The results of the Olive Tree dictionary search are summarized in (56).

³⁹ See Haspelmath (1987, 1993) for an extensive discussion of types of morphological relations in transitivity alternations.

(56) PA decausativization paradigms

Formation		Percentage	Example
a. simplex to complex	CaCCaC → tCaCCaC	66 (44%)	sakkar 'close' tsakkar 'become closed'
	CaCaC → inCaCaC	33 (22%)	kasar 'break' inkasar 'get broken'
b. complex to simplex	CaCCaC → CaCaC	51 (34%)	waqaaʃ 'drop' wiqeʃ 'fall'
Total		150 (100%)	

Two of the PA decausativization paradigms are morphologically well-behaved with regard to the direction of derivation; *inCaCaC* is derived from *CaCaC* and *tCaCCaC* from *CaCCaC* (a). In 66% of the cases, there is a correspondence between the thematic operation and its morphological manifestation; morphology indicates that the intransitive verb is formed by agglutinating a prefix to the transitive one.

However, the third paradigm demonstrates a morphological mismatch: the transitive verb is formed in *CaCCaC*, while the intransitive one is formed on *CaCaC*. As in the MH *CaCaC* - *hiCCiC* relationship, the morphological relationship in (55b) implies that the transitive verb is derived from the intransitive one. However, the thematic relationships between the verbs in the alternation show that the relationship between the verbs in (56b) is one of decausativization. I provide an account for this apparent mismatch in 5.3.

5.1.2. Causativization

The morphology of causativization is relatively predictable in MH and PA, as well as cross-linguistically.⁴⁰ MH causative verbs are usually formed in the *hiCCiC*, as demonstrated in (57). *caʔad* 'march' (57a) is a base form in *CaCaC*, and the verb *hic'id* 'make march' is derived by adding a thematic role of agent and is formed in *hiCCiC* (57b).

- (57) a. dan caʔad
 'Dan marched'

⁴⁰ See Haspelmath (1987, 1993).

b. ha-mefaked hicʔid et dan

‘The commander made Dan march’

Note that *hiCCiC* is not used exclusively for causative verbs. This binyan hosts different types of verbs, including non-causative transitive verbs and even decausatives. However, when an active verb has a causative counterpart it is usually formed in *hiCCiC*. In addition, most causative verbs are derived from active verbs in *CaCaC*. A dictionary search reveals that the majority of instances of causativization involve *CaCaC-to-hiCCiC* formations (82%), i.e. a morphologically simple base and a complex derived form. Other pairs of binyanim that manifest causativization are rare, as summarized in (58).

(58) MH causativization paradigms

Formation			Example
simplex to complex	CaCaC → hiCCiC	45 (82%)	rakad hirkid ‘dance’ ‘make dance’
	CiCeC → hiCCiC	1 (2%)	zinek hiznik ‘spring’ ‘make spring’
complex to complex	niCCaC → hiCCiC	2 (3.5%)	nišba hišbia ‘swear’ ‘make swear’
zero morphology	hiCCiC → hiCCiC	1 (2%)	hišlim hišlim ‘make up with’ ‘cause to make up with’
	niCCaC → CiCeC	1 (2%)	nimlat millet ‘escape’ ‘help escape’
simplex to simplex	CaCaC → CiCeC	2 (3.5%)	lamad limed ‘study’ ‘teach’
complex to simplex	hitCaCeC → CiCeC	3 (5%)	hitxaten xiten ‘marry’ ‘marry’
Total		55 (100%)	

PA has a systematic pattern of causativization, where *CaCaC* is used for basic entries and *CaCCaC*, which is formed by gemination, is used for the formation of their causative alternates (59).⁴¹

⁴¹ Some *CaCaC* verbs consist of the vocalic patterns *i-e* or *i-i* (e.g. *miši* ‘go’). This difference in the vocalic patterns is irrelevant for the purposes of this study.

(59) PA causativization

Basic entry (CaCaC)		Derived Causative (CaCCaC)	
raqas ^ʔ	‘dance’	raqqas ^ʔ	‘make dance’
miši	‘walk’	mašša	‘make walk’
ra:h̄	‘go’	rawwaḥ	‘make go’
šireb	‘drink’	šarrab	‘give X a drink’

5.1.3. Reflexivization

Reflexivization has a relatively predictable pattern in both MH and PA. The most typical binyan for MH reflexive verbs is *hitCaCeC*, and there are also reflexive verbs that are derived in *niCCaC* (60).

(60) MH reflexivization

Formation		Percentage		Example	
a. hitCaCeC formation	CiCeC → hitCaCeC	69	(51%)	nigev ‘wipe’	hitnagev ‘wipe oneself’
	CaCaC → hitCaCeC	11	(8%)	raxac ‘wash’	hitraxec ‘wash oneself’
	hiCCiC → hitCaCeC	11	(8%)	higniv ‘sneak’	hitganev ‘sneak oneself’
	_____ → hitCaCeC	15	(11%)	_____	hityafyef ‘beautify oneself’
b. niCCaC formation	CaCaC → niCCaC	20	(15%)	šataf ‘wash’	ništaf ‘wash oneself’
	hiCCiC → niCCaC	6	(4%)	hicmid ‘stick to’	nicmad ‘stick oneself to’
	CiCeC → niCCaC	3	(3%)	kibec ‘gather’	nikbac ‘gather around (oneself)’
Total		135	(100%)		

A very similar pattern exists in PA, where reflexive verbs are formed in *tCaCCaC*.

(61) PA reflexivization

Formation		Percentage		Example	
CaCCaC	→ tCaCCaC	20	(49%)	ḥammam ‘bathe’	tḥammam ‘bathe modification’
CaCaC	→ tCaCCaC	2	(12%)	laffat ‘turn’	tlaffat ‘turn around’
_____	→ tCaCCaC	19	(2%)	_____	t ^ʕ at ^ʕ t ^ʕ ar ‘put on perfume’
		41	(100%)		

5.1.4. Reciprocalization

The morphology of MH reciprocalization is identical to that of reflexivization. As shown in (62) the majority of reciprocal verbs (82%) are formed in *hitCaCeC*, regardless of the binyan of the transitive verb. The input, similarly to the case of reflexivization, can be formed in *CiCeC*, *CaCaC* or *hiCCiC* and there are also cases of reciprocal verbs without a transitive alternate in the vocabulary.

(62) MH reciprocalization

Formation		Percentage	Example
a. <i>hitCaCeC</i> formation	<i>CiCeC</i> → <i>hitCaCeC</i>	9 (17%)	<i>xibek</i> 'hug' / <i>hitxabek</i> 'hug each other'
	<i>CaCaC</i> → <i>hitCaCeC</i>	5 (9%)	<i>laxaš</i> 'whisper' / <i>hitlaxeš</i> 'whisper one another'
	<i>hiCCiC</i> → <i>hitCaCeC</i>	1 (2%)	<i>hexlif</i> 'replace' / <i>hitxalef</i> 'replace each other'
	_____ → <i>hitCaCeC</i>	28 (54%)	_____ / <i>hitvakeax</i> 'argue with each other'
b. <i>niCCaC</i> formation	<i>CaCaC</i> → <i>niCCaC</i>	4 (8%)	<i>pagaš</i> 'meet' / <i>nifgaš</i> 'meet each other'
	<i>hiCCiC</i> → <i>niCCaC</i>	2 (4%)	<i>hifrid</i> 'separate' / <i>nifrad</i> 'break up'
	<i>CiCeC</i> → <i>niCCaC</i>	1 (2%)	<i>diber</i> 'talk' / <i>nidbar</i> 'talk to each other'
	_____ → <i>niCCaC</i>	2 (4%)	_____ / <i>ne'vak</i> 'fight with'
Total		52 (100%)	

PA is different from MH with respect to reciprocalization in that reciprocal and reflexive verbs in PA tend to have different morphological manifestations. Reflexive verbs are formed in *tCaCCaC*, which contains a geminate, while reciprocal verbs are from in *tCa:CaC*, which contains a long vowel. These two binyanim are similar, distinguished only by the type of the penultimate heavy syllable, CVC vs. CV: When the verb contains more than three stem consonants, reciprocal verbs are also formed in *tCaCCaC* like reflexives, as this is the only binyan for derived forms that can host more than three consonants (63).

(63) PA reciprocalization

Formation		Percentage	Example	
	Ca:CaC → tCa:CaC	9 (32%)	sa:ʕad 'help'	tʕa:ʕad 'help each other'
	CaCaC → tCa:CaC	12 (43%)	katab 'correspond'	tka:tab 'correspond'
	CaCCaC → tCaCCaC	2 (7%)	wašwaš 'whisper'	twašwaš 'whisper to one another'
	_____ → tCa:CaC	5 (18%)	_____	tʕa:baq 'compete with each other'
Total		28 (100%)		

5.1.5. Passivization

The morphology of passivization has been discussed extensively in 3.2 and 3.3. As noted, this is the only syntactic thematic operation in MH. The morphology of MH passivization is steady and predictable.

When a verb is formed in *CiCeC* or *hiCCiC*, its passive counterpart is formed in *CuCaC* or *huCCaC*, respectively, via melodic overwriting. When the base is formed in *CaCaC*, its passive alternate is formed in *niCCaC*.

In PA, there are two binyanim that are used for passivization. *CaCaC* transitive verbs have derived passive counterparts in *inCaCaC*, while *CaCCaC* passive alternates are formed in *tCaCCaC* (see 3.3).

The next section discusses cases, where two MH binyanim compete for the output of the same thematic operation.

5.2. Competing Binyanim

So far I have shown the common morphological manifestation for each type of thematic operation. The data show that there are specific binyanim that typically host verbs resulting from lexical operations, but that in most cases the morphology is not fully predictable. The most typical binyanim for the output of MH lexical operations other than causativization are *hitCaCeC* and *niCCaC*. Most derived forms of *CiCeC* verbs are in *hitCaCeC*; the *CiCeC-hitCaCeC* paradigm is very stable and is hardly subject to irregularities.⁴² However, the derived forms of *hiCCiC* and *CaCaC*

⁴² There are few rare exceptions, e.g. *ilec* 'force' – *neʔelac* 'be forced' (**hitʔalec*).

demonstrate an intriguing variation with regard to their binyan. Some are formed in *niCCaC* while others are formed in *hitCaCeC* (64).

(64) Derived counterparts of *hiCCiC/CaCaC* verbs

Base		Derived form	
a. <i>hirgil</i>	‘make X get used to’	<i>hitragel</i> / * <i>nirgal</i>	‘get used to’
b. <i>hirdim</i>	‘put to sleep’	<i>nirdam</i> / * <i>hitradem</i>	‘fall asleep’
c. <i>katav</i>	‘write’	<i>hitkatev</i> / * <i>nixtav</i>	‘correspond’
d. <i>pagaš</i>	‘meet’	<i>nifgaš</i> / * <i>hitpageš</i>	‘meet each other’

The derived counterpart of *hirgil* (64a) is formed in *hitCaCeC*, while that of *hirdim* is formed in *niCCaC* (64b). In both cases, there is no apparent reason for preferring either of the two binyanim. I argue that the variation among some derived forms arises from a non-crucial ranking of two constraints. On the one hand, *hitCaCeC* is favored because of markedness: it is the less marked output binyan compared with *niCCaC*. *niCCaC*, as well as *CaCaC*, is less productive due to the complex morphology of its inflectional paradigm (Schwarzwald 1996, Bat-El 2001, see 4.3.2.1). It does not preserve its syllabic structure throughout its inflectional paradigm (e.g. *nimšax-yimašex* ‘last’). This results in a phonological load expressed by prosodic shifting in the transition from one tense to another (Bat-El 2002). *hitCaCeC* is prosodically consistent throughout the paradigm. On the other hand, *niCCaC* is preferred because of a faithfulness constraint. In this case, the constraint preserves the adjacency of consonants. *hiCCiC* and *niCCaC* share the same prosodic structure in their past and present forms, as both forms contain a consonant cluster. Markedness, involving uniformity across the inflectional paradigm, competes with faithfulness requiring (partial) uniformity of the derivational paradigm. Owing to these competing constraints, we find derived counterparts of *hiCCiC* taking both forms.

These two competing constraints also result in the occurrence of the same derived verb in two binyanim. For example, the verb *hirtiv* ‘make X wet’ has two decausative counterparts, *nirtav* and *hitratev* ‘become wet’ (as will be discussed in Chapter 6). There is no difference in the meaning and the thematic grids of these two verbs. Such pairs may differ with regard to register, and in some such cases one form is newer than the other.

In addition to the markedness and faithfulness constraints discussed above, there are several morpho-phonological constraints that motivate the choice of *niCCaC* over *hitCaCeC* (Laks 2009). These are faithfulness constraints within the derivational paradigm that either prevent a prohibited cluster in MH or prosodic and vocalic alternation. In addition, they are also costly constraints as they block the application of a phonological process. Note that these constraints relate to verbs in binyanim *hiCCiC* and *CaCaC*, as in these cases morphology is at a crossroads: it has to select between two compatible binyanim. The constraints discussed in the next sections promote a tendency to select *niCCaC*. Note that the selection of *niCCaC* over *hitCaCeC* is only relevant when the base is formed in *hiCCiC* or *CaCaC*, but not in *CiCeC*. *CiCeC-niCCaC* is a very rare paradigm, as opposed to the frequent and stable *CiCeC-hitCaCeC* paradigm, and therefore speakers hardly have any access to it and *niCCaC* is not even a candidate for the derived counterparts of *CiCeC* verbs. In contrast, when the base entry is formed in *hiCCiC* or *CaCaC*, speakers can select between either *niCCaC* or *hitCaCeC* as the binyan of the derived form. The next sections consist of cases where there is a clear tendency to select *niCCaC* over *hitCaCeC*.

5.2.1. Block Deletion/Epenthesis - *t* and *d* Initial Stems

MH prohibits homorganic clusters, thus obeying the Obligatory Countur Principle. *CaCaC* and *hiCCiC* verbs whose initial stem consonant is *t* or *d* are not derived in *hitCaCeC*, since such derivation would create homorganic /tt/ or /td/ clusters. Such a sequence in MH is dealt with via either consonant deletion or vowel epenthesis. A dictionary search reveals no *CaCaC/hiCCiC-hitCaCeC* derivations in stems with an initial *t* or *d*, in contrast to 15 *CaCaC/hiCCiC-niCCaC* derivations. Forming a verb in *niCCaC* eliminates the need for deletion or epenthesis and therefore allows the output to be faithful to the base form. Examine, for example the *hiCCiC* verb *hidhim* ‘amaze’. If its decausative counterpart ‘become amazed’ were formed in *hitCaCeC*, it would yield a verb with a prohibited homorganic cluster *td* (**hitdahem*), which would lead to consonant deletion (**hidahem*). The morphological component avoids this scenario

and opts for *niCCaC*, where no homorganic cluster is created and no phonological process applies (65).

(65) *hiCCiC/CaCaC* → *niCCaC* with /t/ or /d/ initial consonants

Base		Derived form	
hidlik	‘turn on’ (metaphorically)	nidlak / *hidalek, *hitdalek	‘get turned on’
hitrif	‘drive mad’	nitraf / *hitaref, *hittaref	‘get mad’
hidhim	‘amaze’	nidham / *hidahem, *hitdahem	‘become amazed’
tala	‘hang’	nitla / *hitala, *hittala	‘hang oneself’

The prohibition of /tt/ or /td/ clusters stems from a more general constraint on phonological sequences: the Obligatory Contour Principle (OCP). The OCP was originally proposed as a prohibition against adjacent identical tones in lexical representations (Leben 1973). It was later expanded and applied to a variety of phonological processes that involve the avoidance of adjacent identical segments (Goldsmith 1976, McCarthy 1986) and adjacent identical features (Buckley 1990, 1997, Greenberg 1950, Hayward and Hayward 1989, Berkley 1994a 1994b, Padgett 1995, McCarthy 1979, 1981, 1989, Mester 1986, Steriade 1982, Clements and Keyser 1983, Yip 1988b, 1989, Bohas 1990, Mifsud 1995, Keer 1999, Rose 2000, Coetzee and Pater 2008, among others). McCarthy (1988:88) provides a general formulation of the principle, according to which "Adjacent identical elements are prohibited". Root cooccurrence restrictions that are due to the OCP have been documented in Arabic and MH (McCarthy 1994, Berent and Shimron 1997, Everett and Berent 1998, Berent, Everett and Shimron 2001, Frisch, Broe, and Pierrehumbert 1997, Frisch 1998, Ussishkin 1999a, Frisch and Zawaydeh 2001, Frisch 2004). Specifically for the case of gaps in MH, the prohibition is against a cluster of two adjacent consonants that share the same manner and place of articulation in the case of /td/, or identical consonants in the case of /tt/. Examine the transitive *CiCeC* verb *dirder* ‘deteriorate’, which has a derived decausative counterpart in *hitCaCeC*, *hidarder* ‘become deteriorated’. This verb is initially derived as **hitdarder*, but the *t* is deleted in order to prevent a homorganic cluster. *hitCaCeC* verbs like *hidarder* ‘get

deteriorated’, whose initial stem consonant is *t* or *d*, are rare. As I will show in Chapter 7, there are rare cases where where the stem begins with *t* or *d* and *CiCeC* transitive verbs have no derived counterparts in *hitCaCeC* due to the same constraint. However, as shown above in this subsection, when the base form is in *hiCCiC* or *CaCaC* the morphological mechanism avoids *hitCaCeC* and the derived verb is formed in *niCCaC*.

5.2.2. Block Prosodic and Vocalic Alternation

Verbs whose initial stem consonant is a glottal stop have an identical prosodic structure in *hiCCiC* and *niCCaC*.⁴³ The first /i/ of *hiCCiC* (past form) is lowered to /e/ and /e/ is also inserted after the first stem consonant (e.g. *heʔevir* ‘transfer’). The prefix in other tenses is /a/, that is also inserted after the first stem consonant (e.g. *yaʔavir* ‘transfer-fut.’). A similar pattern occurs in past and present forms of *niCCaC* that contain a consonant cluster. Compare, for example, *neʔelam* ‘disappear’ to *nirdam* ‘fall asleep’ (Boložky 1994-5, Schwarzwald 2008). *hiCCiC* and *niCCaC* verbs share the prosodic structure CVCVCVC in all their inflectional paradigms. *NiCCaC* is more faithful to *hiCCiC* than *hitCaCeC*, and hence it may be preferred. Furthermore, such verbs share the same prosodic structure in all tenses of *niCCaC*, similarly to *hiCCiC*, *CiCeC* and *hitCaCeC*, where there is no prosodic alternation regardless of the stem consonants. They do not demonstrate the morphological complexity discussed in chapter 4, and this provides *niCCaC* with another advantage over *hitCaCeC*. A dictionary search shows that that out of 12 *hiCCiC* verb whose first stem consonant is a glottal stop, 10 (83%) have derived counterparts in *niCCaC*, while only 2 have derived counterparts in *hitCaCeC*. Some examples are given in (65).

(66) *hiCCiC* → *niCCaC* derivations with glottal stops

Base		Derived form	
heʔeliv	‘insult’	neʔelav / * hitʔalev	‘become insulted’
heʔeniš	‘punish’	neʔenaš / * hitʔaneš	‘become punished’
heʔešim	‘blame’	neʔešam / * hitʔašem	‘blame’

⁴³ The glottal stop is deleted by most speakers.

5.2.3. Block Metathesis

Some *hiCCiC* and *CaCaC* verbs with strident consonants as their initial stem consonants do not have a derived form in *hitCaCeC*, as this would result in metathesis (e.g. *histarek* ‘comb oneself’). *niCCaC* is again selected to avoid the metathesis and keep the derived counterpart faithful to the base. A dictionary search shows that out of 8 *hiCCiC* verb whose first stem consonant is a strident, 7 (88%) have derived counterparts in *niCCaC*, while only one (12%) has a derived counterparts in *hitCaCeC*.

(67) *hiCCiC/CaCaC* → *niCCaC* derivations with initial stridents

Base		Derived form	
hicmid	‘stick’	nicmad / *hictamed	‘become stuck’
zarak	‘throw’	nizrak / *hizdarek	‘throw oneself’
hišʔir	‘leave’	nišʔar / *hištaʔer	‘remain’

Note, again, that formation in *hitCaCeC* is not blocked when the base is formed in *CiCeC*. This is because these constraints are outranked by markedness: *CiCeC-hitCaCeC* is the unmarked paradigm and is subject to hardly any variation. However, when the base is *CaCaC* or *hiCCiC*, the morphological component tends to select *niCCaC* in order to avoid metathesis in *hitCaCeC* even though that process applies fully: metathesis is exception-free, but it is not cost-free. It is a lexical process (sensitive to morphological structure) rather than a late phonetic process. That is, although metathesis is exception-free it still violates phonological faithfulness, and if there is a candidate that does not violate faithfulness, that candidate is preferred. Selecting *niCCaC* in this case is not only faithful to the base form but also economical, as it blocks the application of another process. Nonetheless, the ‘block deletion/epenthesis’ constraint is better-motivated than the ‘block metathesis constraint’, which is subject to more exceptions (e.g. *hicdic-hictadek*/**nicdak* ‘justify oneself’).

5.2.4. Interim Summary

The analysis reveals the effect of morpho-phonological criteria on the selection of binyan for the output of thematic operations. The four constraints I have discussed lead directly to instances in which the output of thematic operations is determined by morpho-phonological considerations. In all other cases where the first stem consonant does not belong to any of the three categories discussed in 5.2, there is no clear tendency to favor one binyan over the other as the derived counterpart of *hiCCiC* verbs. In 8 out of 17 cases (47%) *niCCaC* is selected, while in 9 cases (53%) *hitCaCeC* is selected.

The constraints discussed in 5.2 take effect only when thematic operations occur in the lexicon and not in the syntax. There are no morpho-phonological constraints on the output of MH passivization. As shown in chapter 3, the morphology of MH passivization is exception-free and involves mainly a segmental change. I assume that it is that way in order to avoid the violation of constraints and the application of phonological processes because the outputs of syntactic operations are not listed. Note that the above constraints reflect a tendency that is subject to irregularities. These irregularities provide further evidence that the discussed operations apply in the lexicon, which is idiosyncratic unlike the syntax.

5.3. Mismatches between Thematic Relations and Morpho-phonological Relations

This section is devoted for cases where valence changing and morphological formation ‘collide’: cases where the thematic relationship between two verb forms suggests that form A is derived from form B, while morphology indicates the reverse both in MH and PA (e.g. the transitive MH *hikpi* ‘freeze’ and its decausative counterpart *kafa* ‘freeze (become frozen)’).

This section offers a solution to this kind of morpho-thematic mismatch by drawing on (i) the presumed existence of frozen lexical entries in the lexicon and (ii) information about the diachronic development of the particular alternates. I argue that,

in cases where the thematic relation between verbs suggests that form A is derived from form B, while the morphology indicates the reverse, it is in fact the case that form A entered the language first, derived from a frozen lexical entry. Later on the frozen entry, namely form B, received a morphological shape based on the form of A, and was inserted into the vocabulary of the language. Specifically, I propose a mechanism of morphological defrosting and filling that operates according to systematic guidelines.

5.3.1. The Morpho-thematic Mismatch

As discussed in previous parts of the dissertation (see 2.2 and 5.1), transitive-intransitive alternations within verbal systems and their morphological manifestation have been an object of study and have been accounted for using various approaches (see for example Haspelmath 1987, 1993, Borer 1991, Reinhart 1996, Doron 2003a, 2003b, Reinhart and Siloni 2005 among many others). This section examines transitivity alternations that demonstrate an apparent mismatch between the thematic and the morphological relationships between the alternates. Specifically, I address cases of transitivity alternations that are, thematically, clear cases of decausativization, but that look morphologically like cases of causativization. Such cases constitute 11% of the instances of decausativization in MH and 34% of the instances in PA (see 5.1.1). Examine the English transitive-intransitive alternations in (68) and (69).

- (68) a. The soldiers marched.
 b. The commander marched the soldiers.
- (69) a. The ice melted.
 b. The sun melted the ice.

Following Reinhart and Siloni (2005), I assume that the transitivity alternations in (68) and (69) demonstrate two different thematic operations that apply in different directions (see 2.2.1). The alternation in (68) is causativization, in which the transitive verb form is derived from the intransitive one via the addition of a thematic role. The

alternation in (69) is labeled decausativization: the intransitive form is derived from its transitive alternate by the reduction of a thematic role. The two operations differ from each other with regard to both their domain of application - namely the set of verbs to which they can apply - and the type of manipulation executed on the theta grid of the input.

Most thematic operations in MH and PA have some morphological manifestation. Since all operations, by definition, crucially involve the directionality of derivation, one would expect the derived form, and not the base form, to be morphologically marked. The causative verb is expected to be marked in causativization, while the intransitive verb is expected to be marked in decausativization. However, there are cases of decausativization where the morphological relationship between the two alternates does not correspond to their thematic relationship in this way.

In order to account for this, it is important to recall the distinction between the two facets of these derivational operations: the thematic derivation and the morphological formation. The thematic derivation is related to the organization of items in the mental lexicon, independently from their morphology. Such a derivation involves manipulation of the thematic grids of verbs by adding, reducing or modifying thematic roles. Morphological formation involves formation of one word based on another word, applying different morphological processes like affixation, compounding, ablaut, clipping, and many others. The two processes usually intertwine: when one concept is derived from another, the morphological mechanism marks the derived concept. However, there are also different patterns of morphological behavior. The case of MH decausativization provides an excellent case study for examining the morpho-thematic phenomena involved in valence changing.

The morphology of causativization is relatively predictable in MH, as well as cross-linguistically, as already noted in 5.1.2. MH causative verbs are usually formed in the *hiCCiC* binyan. For instance, take the MH version of the English example of causativization in (70): *caʔad* ‘march’ (70a) is a base form in *CaCaC*, and the verb

hicʔid ‘make march’ is derived by adding an agent thematic role and is formed in *hiCCiC* (70b).

- (70) a. dan caʔad
‘Dan marched’
b. ha-mefaked hicʔid et dan
‘The commander made Dan march’

The morphology of decausativization is less predictable than that of causativization, as shown in 5.1.1. There are cases of complex-to-simplex formation, in which the basic transitive entry is formed in a morphologically marked binyan (*hiCCiC*), while its decausative alternate is formed in an unmarked binyan (*CaCaC*). Examine the transitive-decausative alternations in (71) and (72).

- (71) a. ha-eš ximema et dan
‘The fire warmed Dan’
b. dan hitxamem
‘Dan warmed up’
- (72) a. ha-kor hikpi et dan
‘The cold froze Dan’
b. dan kafa
‘Dan froze’

Both the transitive verbs, *ximem* (71a) and *hikpi* (a), are the basic entries whose thematic grids contain a cause. Their derived decausative counterparts are *hitxamem* and *kafa* respectively, which are derived by reduction of the cause role. Thematically, the relationship between the two members of each pair is identical, but the morphological relationships between pair members differ across pairs. The morphology of the *ximem-hitxamem* derivation matches the relevant thematic derivation: *hitxamem*, the derived form, is morphologically marked as such by the prefix /hit-/ of *hitCaCeC*. The morphology of the *hikpi-kafa* derivation, on the other hand, resembles the morphology of causativization, as in the *caʔad-hicʔid* pair in (70).

Still, given the thematic properties of the paradigm, the *hikpi-kafa* is clearly not an instance of causativization.

This morphological formation pattern stands in sharp contrast to the direction of thematic derivation in the operation of decausativization. The thematic information encoded for each verb in such pairs tells us that the intransitive verb is a decausative derived from its transitive counterpart, but the morphological relationship between the two suggests that the transitive verb is the derived form. In other words, there is a clear mismatch between the thematic derivation and the morphological formation. What seems thematically to be derived in one direction seems morphologically to be formed in the opposite direction. I label this conflict ‘morpho-thematic mismatch’. Why does the mismatch emerge and how can it be accounted for?

I begin by accounting for this mismatch in MH. As mentioned above only 11% of the cases of decausativization show a morpho-thematic mismatch. Moreover, this mismatched pattern is not productive, as is evident from the formation of new verbs based on existing MH words or loan words (see Chapter 4). The thematic operation of causativization is not productive at all, in the sense that hardly any new causative verbs enter the language. However, transitive verbs with their decausative counterparts enter the language constantly. The selection of a binyan for their formation clearly corresponds to their thematic status. Transitive verbs are formed almost exclusively in *CiCeC* or *hiCCiC*, while decausative verbs, as well as other verbs that are derived by valence changing, are formed in *hitCaCeC*. Thus new intransitive verbs with the semantics of decausatives are marked by the morphological mechanism as derived entries rather than basic ones. Binyan paradigms that do not exhibit simplex-to-complex formations (with an internal hierarchy between them) are a closed set and do not occur in new verb forms. In other words, the morpho-thematic mismatch in MH does not constitute a major part of the paradigmatic relationships in the language. Nonetheless, it is still a puzzling behavior that should be accounted for.

In order to resolve this apparent conflict between morphological and thematic relationships, I make use of the notion known as frozen lexical entry, as well as

historical information about the formation of Hebrew verbs. In the next section I begin by presenting the notion of frozen entry and use it together with diachronic information to resolve the morpho-thematic mismatch.

5.3.2. The Notion of Frozen Lexical Entries

When attempting to reach generalizations about word formation patterns, one often encounters the phenomenon of sporadic derivational gaps: cases in which a derivational rule predicts the existence of a word which does not actually exist, apparently for no particular reason. Any model that assumes word formation rules should address the fact that some of the potential outputs of these rules are absent from the vocabulary. In order to account for this phenomenon, Halle (1973) suggests that cases of ‘accidental gaps’ in the list of actual words in a given language (e.g. English *arrival* vs. **arrivation*) occur when outputs of lexical rules are arbitrarily marked as [-lexical insertion], which results in their exclusion from the list of actual words. Jackendoff (1975) suggests that such gaps are not represented independently in the mental lexicon like actual words; instead, they are subparts of the lexical entries from which they are derived. A non-existent word like **retribute*, for example, would be listed in the mental lexicon as a subpart of the lexical entry for the word *retribution*. Since there is no independent lexical entry, **retribute* does not exist as an actual word.

Reinhart (2002) and Horvath and Siloni (2008) distinguish ‘the mental lexicon’ from ‘the actual vocabulary’ of a particular language (the latter being the sum of words in a given language) and argue for the existence of frozen lexical entries, forms that do not exist in the actual vocabulary of a language but are assumed to have a representation in the mental lexicon. Frozen entries are missing from the articulatory module of language but they are assumed to be conceptually represented in the mental lexicon. The frozen entry, which is not accessible for syntactic derivations, can nonetheless serve as input for lexical operations. It is crucial to distinguish between the terms ‘lexical gap’ and ‘frozen entry’. The former is a more general term to refer to

words that are conceptually possible but do not exist as part of the actual vocabulary in a language. The latter refers to a specific kind of lexical gap that is relevant to the direction of the derivation. In the case of a frozen entry, the input is missing but the output—the derived form - exists as an actual word. Fadlon (to appear) provides experimental psycholinguistic evidence for the psychological reality of frozen entries. She claims that, given the common assumption that the lexical component of language interfaces with the conceptual system (Fodor 1975, Pinker 1994, Sperber and Wilson 1997, among others), it is reasonable to assume that lexical encoding will have an effect on the perception of the matching concept. Fadlon shows that frozen transitive alternates of existing decausatives have psychological reality. The results of her study show that the concept of frozen lexical entries that lack a corresponding vocabulary item is not an ad hoc, unfalsifiable theoretical tool.

5.3.3. Morphological Filling of Frozen Entries

The notion of frozen lexical entries is relevant to gaps within the transitive-decausative alternation and other valence-change relationships. There are cases in which the transitive counterpart of a decausative verb is missing in one language but exists in another (or in earlier stages of the same language). Examine, for example, the decausative verb *fall* in MH (73a) and English (74a). It has a transitive alternate in MH, *hipil* ‘make fall’, (73b) but not in English (74b).

- (73) a. ha-agartal nafal
 ‘The vase fell’
 b. ha-ruax hipila et ha-agartal
 ‘The wind caused the vase to fall’
- (74) a. The vase fell
 b. *The wind fell the vase

The lack of a transitive alternate for the verb *fall* in English is an example of a sporadic gap. Gaps cannot be accounted for semantically, since they occur idiosyncratically in some languages but not others. There is also no phonological

explanation that would exclude the occurrence of a transitive *fall*. Given the assumption that decausative verbs are derived from their transitive alternates, it is important to address the idiosyncratic absence of some inputs. An approach that assumes frozen lexical entries views these missing inputs as present in the mental lexicon but marked as restricted from the actual vocabulary. This approach is similar to that of Halle (1973) and Jackendoff (1975), who also provide hidden representation accounts for derivational gaps. Since the missing transitive verbs exist in the mental lexicon as frozen entries, they are available to serve as inputs for the thematic derivation of decausative verbs even though they are not present in the actual vocabulary.

There are also frozen inputs for decausative verbs in MH: decausative verbs that are formed in a given binyan without a transitive alternate in another binyan. Compare the two decausative verbs *hitrageš* ‘become excited’ (75a) and *hištanek* ‘become strangulated’ (76a), both formed in *hitCaCeC*. While *hitrageš* has a transitive alternate in *CiCeC*, *rigeš* ‘make X excited’ (75a), from which *hitrageš* is derived, *hištanek* (76a) has no transitive alternate that surfaces as an actual word, e.g. **šinek* (76b). The verb *hištanek* can be taken to be derived from a frozen lexical entry (lacking a morphological shape but able to feed decausativization) that denotes ‘make X strangulated’.

- (75) a. dan *hitrageš*
 ‘Dan became excited’
 b. ha-šir *rigeš* et dan
 ‘The song made Dan excited’
- (76) a. dan *hištanek*
 ‘Dan became strangulated’
 b. *ha-šir *šinek/hišnik* et dan
 ‘The song made Dan strangulated’

Frozen lexical entries of decausative verbs sometimes ‘defrost’ and surface as actual words. In languages like MH, these ‘defrosted’ verbs are formed in one of the

existing binyanim like any new verb entering the language (Berman 1978, Bolozky 1978, Schwarzwald 1981, 2001a, Bat-El 1994, among others). In certain cases, historical data tell us that at some point in the language's history a particular transitive verb did not exist but its decausative counterpart did. The decausative verb *hitʔalef* 'faint', for example, is formed in *hitCaCeC*, which is typical for decausative verbs. Diachronic examination reveals that, until recently, this verb had no transitive alternate 'make X faint'. On the frozen entry approach, such a verb will have been stored in the mental lexicon but frozen. In recent years, the vocabulary entry has surfaced, and the actual verb is formed in *CiCeC* (*ilef* 'make X faint'). I refer to such an occurrence as an instance of gap-filling via the defrosting of a lexical entry: the morphological mechanism fills a gap by providing a frozen entry with an actual form. How is this process executed? Put it differently, how is the morphological shape of a 'defrosted' lexical entry determined? I propose that the process takes place according to the following guidelines (77).

(77) Morphological Filling of Frozen Lexical Entries (MOFFLE)

- a. Frozen lexical entries can defrost and receive phonetic and morphological representations.
- b. Determining the shape of defrosting entries takes into account two criteria:
 - (i) the typical thematic status of the morphological candidates
 - (ii) frequency of paradigmatic relations between forms

The MOFFLE guidelines state that when the morphological component fills slots via defrosting, two criteria are taken into consideration. The first criterion is the thematic status of the binyanim, which determines which binyan can host the new entry. The binyan selected has to be one that usually hosts basic entries in the lexicon and not derived ones. As noted in 3.1, *CiCeC* and *hiCCiC* tend to be used for basic entries (and *hiCCiC* for causativization), while *hitCaCeC* and *niCCaC* typically host derived entries that result from a reduction in the syntactic valence. *CaCaC* is the only

binyan that is used equally for both basic and derived entries. In cases where a decausative verb has a frozen transitive counterpart, the two candidates for filling the entry are *CiCeC* and *hiCCiC* (not *niCCaC* or *CaCaC*).⁴⁴ The two candidates for the transitive alternate of the decausative verb *hitʔalef* ‘faint’, for example, would be *ilef* (*CiCeC*) and *heʔelif* (*hiCCiC*). How does the morphological mechanism choose between these two options? The second relevant factor in determining how frozen entries are filled is the typical relationship between the binyanim involved. Specifically, which pairs of binyanim are typical for the relevant thematic relationship? For example, when a transitive verb is formed in *CiCeC*, its decausative alternate is almost exclusively formed in *hitCaCeC*, and hardly ever in *niCCaC*. Transitive verbs in *hiCCiC* have decausative alternates both in *hitCaCeC* and *niCCaC*, without any criterion that can accurately predict which binyan will be selected in a given case. The *CiCeC-hitCaCeC* paradigm is much more common and stable than *hiCCiC-hitCaCeC*, so the most suitable candidate for the transitive alternate of a *hitCaCeC* decausative verb would be in *CiCeC*, not in *hiCCiC*. As a result, *ilef* ‘make X faint’ is formed as the transitive alternate of *hitaʔalef* ‘faint’. As I show in 5.5, when the decausative verb is formed in *CaCaC*, its defrosted transitive counterpart is formed in *hiCCiC* and not in *CiCeC*, because the *CaCaC-hiCCiC* paradigm is more common than *CaCaC-CiCeC*. Note that, according to the theoretical framework assumed here, both the basic and the derived entry are stored in the lexicon with their full morpho-phonological representation.

So far I have argued that frozen lexical entries can surface in the actual vocabulary through morphological filling. I have proposed a set of guidelines (MOFFLE) that predict how this mechanism works and state the criteria on which it relies. The next sub-section shows how this account resolves morpho-thematic mismatches.

⁴⁴ *CaCaC* is less appropriate as a candidate because it can host both basic and derived entries, making it less typical for transitive verbs in comparison to *CiCeC* and *hiCCiC*.

5.3.4. Resolving the Morpho-thematic Mismatch

How are the MOFFLE guidelines relevant to the question of directionality discussed in this study? I argue that apparent mismatches between thematic derivation and morphological formation can be accounted for based on the historical relationship between the alternates. Specifically, to resolve such apparent mismatches I rely on the existence of frozen inputs. I resume discussion of the alternates in (70) and (72), repeated here as (78) and (79).

- (78) a. dan caʔad
 'Dan marched'
 b. ha-mefaked hicʔid et dan
 'The commander made Dan march'
- (79) a. ha-kor hikpi et dan
 'The cold froze Dan'
 b. dan kafa
 'Dan froze'

The alternation in (78) is a clear case of causativization. The verb *caʔad* (a) is a basic lexical entry whose thematic grid contains an agent. It is an appropriate candidate for causativization, and it indeed undergoes the operation: an agent is added to its thematic grid, yielding *hicʔid* 'make X march' (7878b).

The alternation in (79) is a case of decausativization, where the transitive verb *hikpi* (79a) is a basic entry whose thematic grid contains a cause and a theme. The participant in the event that causes the freezing can be either animate or inanimate. The verb *hikpi* undergoes decausativization, in which its cause role is reduced, deriving the intransitive verb *kafa* (79b). Although *kafa* is thematically derived from *hikpi*, it seems that *hikpi* is morphologically formed on the basis of *kafa*. If *hikpi* is a basic entry, why would the morphological mechanism form its decausative counterpart in *CaCaC* by deleting its prefix? This stands in sharp contradiction to the morphological processes that generally apply in MH and many other languages, where a morphologically marked form, i.e. one with an affix, is formed on the basis of an

affix-less form.⁴⁵ Examples of decausativization and causativization paradigms and their representations in the mental lexicon are presented in (80), where (80c) involves a morpho-thematic mismatch.

(80) Lexical paradigms

<u>Decausativization paradigms:</u>		<u>Causativization paradigms:</u>	
a. ximem	→ hitxamem	d. caʔad	→ hicʔid
b. haras	→ neheras	e. xatam	→ hextim
c. hikpi	→ kafa		

To solve this puzzle, I argue that, in the case of the apparent mismatch, the derived form existed first and the basic one was morphologically filled later on. Specifically, the decausative verb *kafa* entered the language first, formed in *CaCaC*, and had no actual transitive counterpart. The transitive counterpart existed in the mental lexicon only as a frozen entry, as in (81).

(81) Decausativization paradigms - stage I

ximem	→	hitxamem
haras	→	neheras
concept of 'freeze-trans.'	→	kafa

The selection of *CaCaC* for a decausative rather than *niCCaC* (*nikpa*) or *hitCaCeC* (*hitkape*) is indeed accidental, but it is also not surprising, since *CaCaC* can host both basic and derived entries. The apparent mismatch between thematic derivation and morphological formation is accidental and surprising, assuming that the relevant operation that applies here is decausativization. But which type of accident is it? If we assume that *kafa* was formed first in *CaCaC* and then *hikpi* was filled in using *hiCCiC*, there is only one accident involved: the selection of *CaCaC* for a decausative

⁴⁵ See Raffelsiefen (1992), Nir (1993), Ravid (1995) and Schwarzwald (2003, 2010) for the discussion of back formation.

verb. The selection of *hiCCiC* for filling the transitive entry is, however, principled: it is motivated by consistent word formation rules, as elaborated in the MOFFLE guidelines. When the transitive alternate of *kafa* is defrosted, the morphological mechanism must select a binyan for it as it does for every verb that enters the language. According to the MOFFLE guidelines (77), this mechanism has to select a binyan based on existing paradigms of transitive-intransitive alternations and based on the thematic status of the binyanim. As shown in (82) below, the two possible candidates for the formation of the transitive verb ‘freeze’ are *hikpi* in *hiCCiC* and **kipe* in *CiCeC*, as both binyanim are used for basic entries. Examining the paradigmatic relationships between other existing forms reveals that the *hiCCiC-CaCaC* paradigm is much more frequent than the *CiCeC-CaCaC* paradigm in transitivity alternations. Although the former paradigm is more typical for causativization, *hiCCiC*, and not *CiCeC*, is the ‘usual mate’ of *CaCaC* in derivational relations in general. The morphological mechanism takes this into account when selecting a binyan. The transitive counterpart of *kafa* is therefore morphologically filled via formation in *hiCCiC*.

(82) Candidates for filling the frozen transitive alternate of *kafa* ‘freeze’

Binyan	Verb	Relevant Criteria
hitCaCeC	*hitkape	Both binyanim are atypical for the formation of basic entries
niCCaC	*nikpa	
CiCeC	*kipe	The <i>CaCaC-hiCCiC</i> paradigm is more common and stable than the <i>CaCaC-CiCeC</i> paradigm

As show in (83), the frozen basic entry that demotes ‘freeze-trans.’ defrosts and is morphologically formed based on its derived counterpart ‘freeze’.

(83) Decusatization paradigms - stage II

ximem	→	hitxamem
haras	→	neheras
hikpi	→	kafa

I argue that morphological accidents are more likely to occur in the formation of the earlier form than in the formation of a derived entry, since the derivation of words in the lexicon is predictable to some extent and exhibits certain patterns. There is greater idiosyncrasy in the selection of templates for basic entries. In the case of the transitive-decausative relation, the selection of a binyan for the transitive basic entry is always accidental to some extent: it can be formed in *CiCeC*, *hiCCiC*, or even in *CaCaC* for no apparent reason. On the other hand, the binyan selection for its derived decausative counterpart is much more predictable: it is determined based on the binyan of the basic entry.

Going back to the *hikpi-kafa* paradigm, if we assumed that *kafa* was formed on the basis of *hikpi*, we would have to conclude that two accidents took place in the word formation. The first accident is the selection of *hiCCiC* instead of *CiCeC* or *CaCaC* for the basic entry. The second accident, which is far more surprising, is the choice of *CaCaC* for an entry derived from a *hiCCiC verb*. Thus, accidental word formation would occur both in the formation of the base and the derived verb. The proposed analysis suggests that only one accident took place.

A diachronic examination of the occurrence of MH verbs provides strong support for this explanation, namely, that the derived form existed first and the basic one was morphologically filled later on. A search in Avenyon's (1997) Sapphire dictionary reveals 44 cases of decausativization in which there is an apparent mismatch between thematic and morphological relationships. These are cases where the transitive verb is formed in *hiCCiC* while its decausative counterpart is formed in *CaCaC*. In 10 out of 44 such pairs, the decausative verb in *CaCaC* is known to have existed before its

hiCCiC transitive counterpart. There is only one instance in which a *hiCCiC* form predated a *CaCaC* form. In all of the remaining 33 pairs of verbs, including *kafa* and *hikpi*, both verbs in each pair are dated from the same period; I assume that even in these cases *CaCaC* preceded *hiCCiC* and the latter was formed based on *CaCaC*. The fact that there is historical information about which form existed first even with regard to some of the verbs supports the claim about morphological filling. In addition, there are some decausative verbs in *CaCaC* that do not have transitive alternates in any binyan. An alternate that is absent in this way is assumed to be a frozen entry in the Frozen entries can be filled by the morphological mechanism and receive phonetic content. Indeed, when such transitive entries defrost, they are formed in *hiCCiC* based on the MOFFLE guidelines.

Examine also the group of semantically similar verbs in (84).

(84) Verbs denoting death

Binyan	Verb	
CaCaC	met	'die'
	šavak	'pass away'
	gava	'die'
hitCaCeC	hitpager	'drop dead'
niCCaC	nispa	'get killed (tragically)'
	neherag	'get killed'

All verbs in (84) are decaustives and have similar semantics, in the sense that they all denote death. They are formed in three different binyanim, and the selection of one binyan over another in each case is accidental. Nonetheless, none of them is formed in *CiCeC* or *hiCCiC*, which are typical for basic entries in the lexicon. Some of the verbs in (84) have transitive alternates that denote 'kill' (e.g. *harag* 'kill', the transitive alternate of *neherag* 'get killed'), while others have no transitive alternates. The verb *šavak* 'pass away', for example, is used mainly in the expression *šavak xayim* (85a) that also denotes 'pass away' and has no transitive alternate. A search reveals that the transitive alternate of this verb in the same expression has been used to denote 'cause to pass away'. The speaker who used this verb filled a frozen entry by forming the

transitive alternate in *hiCCiC*, yielding the verb *hišbik* in the expression *hišbik xayim* (85b). Although there is only one instance of this expression, the selection of binyan is not accidental. This morphological filling is also performed based on the MOFFLE guidelines: *hiCCiC* is the optimal candidate for a transitive alternate of *CaCaC* due to the relatively high frequency of the *CaCaC-hiCCiC* paradigm.

- (85) a. mifleget ha-avoda **šavka** xayim
 ‘The labor party defuncted’
<http://www.ynet.co.il/articles/0,7340,L-3622316,00.html>
- b. ehud barak **hišbik** xayim et mifleget ha-avoda
 ‘Ehud Barak made the labor party defunct’
<http://www.nrg.co.il/online/41/1/MS1/965/130.html>

Thematically derived verbs that ‘misbehave’, i.e. that are formed in a binyan that is atypical of their thematic status, are also exposed to morphological variation to a greater extent (see 3.2.5. and 3.2.6). Many of them are formed in other ‘appropriate’ binyanim that usually are used for derived entries (86).

- (86) Morphological variation of derived entries⁴⁶
- | | | | |
|-------|---|-----------|-----------------------|
| gavar | ~ | hitgaber | ‘increase’ |
| yavaš | ~ | hityabeš | ‘become dry’ |
| kafa | ~ | hitkape | ‘become frozen’ |
| samax | ~ | histameax | ‘be(come) happy’ |
| paxad | ~ | hitpaxed | ‘be(come) frightened’ |

The examples in (87)-(89) below demonstrate cases of near minimal triplets of sentences in which the verb *kafa* ‘freeze’ is also formed in other binyanim, *niCCaC* (*nikpa*) and *hitCaCeC* (*hitkape*).

- (87) en li hesber lama **kafati** bimkomi lamrot še-yaxolti licpot ma yikre .
 ‘I have no explanation to why I froze in my place although I could anticipate what would happen’
<http://www.blogs.bananot.co.il/showPost.php?itemID=11297blogID=182>

⁴⁶ Some of the instances in (86) are part of the language, while others are isolated uses, but all of them illustrate the same pattern of change.

(88) neta gam šalxa leevri mabat meruša ve-koes. **nikpeti** bimkomi.

‘Neta also gave me a wicked and angry look. I froze in my place’

(<http://israblog.nana10.co.il/blogread.asp?blog=14259&blogcode=1420443>)

(89) hayom ba-boker ba li livdok et macav haršamati be-atar ha-oniversita, ve-ma macati?!?! **hitkapeti** bimkomi, nikrati be-toxi...

‘this morning I had a chance to check up on my registration at the university website, and what did I find out?!?! I froze in my place, I was torn...’

(<http://forum.bgu.co.il/index.php?s=30170d9c13547186866b32706c79ff2f&andshowtopic=11721st=480p=1036226#entry1036226>)

Although the verbs in (88)-(89) are very rare and are technically considered ungrammatical, the fact that they occur only when the *CaCaC* form is a decausative verb indicates that such variation is not random but rather stems from the thematic status of verbs like *kafa* that are stored as derived entries. This provides further evidence for the claim that they are indeed stored in the lexicon as derived entries and that apparent complex-to-simplex derivations are accidental: the morphological component is sensitive to this distinction and fixes such ‘accidents’ by changing their binyan accordingly. The decausative *CaCaC* verbs in (86) change into *hitCaCeC* in order to be morphologically marked as derived verbs. The selection of *CaCaC* decausative verbs that undergo a morphological change is arbitrary, but the fact that the morphological mechanism changes thematically derived verbs into *hitCaCeC* and hardly ever does so to basic entries shows that the morphological mechanism also operates consistently.

Evidence based on morphological variation also comes from *hiCCiC* homophonous verbs that have decausative and transitive meanings, respectively. The verb *heʔedim*, for example, derived from the adjective *adom* ‘red’, denotes both making something/someone red and becoming red (see Borer 1991). *hiCCiC* is used for the formation of intransitive verbs mainly for verbs that are derived from adjectives (Rosén 1956). The formation of intransitive verbs in *hiCCiC* is not productive for existing forms or new verbs, and it is considered irregular. A dictionary

search reveals that out of 614 *hiCCiC* verbs only 52 (8.47%) are intransitive, and that out of these 52, 34 (5.54%) also have a transitive meaning. Only 18 (2.93%) *hiCCiC* verbs are exclusively intransitive. Some of the *hiCCiC* intransitive verbs change to *hitCaCeC* in order to be marked as derived forms, e.g. *hitʔadem*, as *hitCaCeC* is more typical for such verbs (90). Note that the change into *hitCaCeC* never occurs for the transitive homophone. This is because *hiCCiC* is typical for the formation of transitive verbs and there is no motivation for a change. The next chapter will discuss morphological variation and provide further evidence that the morphological mechanism distinguishes between base and derived entries

(90) Marking *hiCCiC* verbs as intransitive in *hitCaCeC*

heʔedim	~	hitʔadem	‘become red’
hilbin	~	hitlaben	‘become white’
hexvir	~	hitxaver	‘become pale’
hikriax	~	hitkareax	‘become bald’

The verbal morphology of Palestinian Arabic provides further support for the directionality of derivation. PA has a distinct pattern of causativization, where *CaCaC* is used for basic entries (91a) and *CaCCaC*, which is formed by gemination (91b), is used for the formation of their causative alternates (see more examples in (59)). As in MH, the morphological formation reflects the direction of thematic derivation.

(91) a. il-awla:d raqas^u

‘The children danced’

b. il-muʔallem raqqas^u il-awla:d

‘The teacher danced the children’

PA decausativization exhibits three main paradigms of verb formation, as shown in (56), repeated in (92).

(92) PA decausativization

Basic entry		Derived decausative	
a. CaCaC-inCaCaC derivation			
kasar	'break'	inkasar	'become broken'
ħaraq	'burn'	inħaraq	'get burnt'
b. CaCCaC-tCaCCaC derivation			
sakkar	'close'	tsakkar	'become closed'
wajjaʃ	'cause pain'	twajjaʃ	'suffer pain'
c. CaCCaC-CaCaC derivation			
waqaaʃ	'drop'	wiqeʃ	'fall'
saxxan	'warm X'	saxan	'warm up'
qawwa	'make strong'	qiwi	'become strong'

Two of these paradigms are morphologically 'appropriate' with regard to the direction of derivation. When the basic transitive verb is formed in *CaCaC*, its derived decausative is formed in *inCaCaC* (92a), and when the basic entry is in *CaCCaC*, the decausative verb is formed in *tCaCCaC* (92b). In both cases, morphology indicates that the intransitive verb is formed on the basis of the transitive one by agglutinating a prefix. As noted earlier, these two paradigms constitute 66% of the cases of decausativization. However, the third paradigm (92c) demonstrates a morphological mismatch, where the transitive verb is formed in *CaCCaC* while the intransitive one is formed in *CaCaC*. Like the MH *CaCaC-hiCCiC* relationship, the morphological relationships in (92c) apparently suggest that the transitive verb is derived from the intransitive one. However, the thematic relationship between the verbs in the alternation, when compared to the relationship between verbs in causativization in (91), shows that the relationship between the verbs in (92c) is one of decausativization. As in my analysis of MH, I assume that in cases like (92c), the decausative verbs entered the language first and were formed in *CaCaC*, as this binyan hosts both basic and derived entries. The decausative verbs would have had no transitive alternate and been derived from a frozen entry. Only later on would the transitive entry have surfaced and been morphologically filled. According to the MOFFLE guidelines (77), the most appropriate candidate for the formation of the transitive alternates of *CaCaC* decausative verbs is *CaCCaC*, based on the frequency

of *CaCaC-CaCCaC* paradigms. *tCaCCaC* would not be appropriate, as it tends to host mostly derived entries and as *CaCaC-tCaCCaC* paradigms are quite rare in the language. The frequency of other binyanim like *aCCaC* and *iCtaCaC* is very low (Rosenhouse 2002), making *CaCCaC* the optimal candidate for the morphological filling of the transitive alternates of *CaCaC* verbs.⁴⁷ As shown for MH, morphological variation provides further evidence that *CaCaC* decausative verbs are indeed derived—and not basic—entries. Some such verbs change into *tCaCCaC*, which is typical of verbs that result from valence reduction, like MH *hitCaCeC*. The verb *qawwa* ‘make strong’ (92c), has decausative counterparts in *CaCaC* (*qiwi*) and in *tCaCCaC* (*tqawwa*), where both verbs denote ‘become strong’. Here again, I argue that such change of binyan occurs in order to avoid a mismatch between thematic and morphological relationships.

Section 5.3 accounted for apparent morpho-thematic mismatches in transitivity alternations and decausativization. It addressed the connection between thematic derivation and morphological word formation, focusing on cases where thematic relationships indicate one direction of derivation while the morphology does not match this direction. I argued that there is no real contradiction in such cases and that the apparent mismatch can be resolved by assuming the existence of frozen lexical entries that serve as input for lexical thematic operations. I argued that frozen entries can defrost via a mechanism of morphological filling that operates according to the proposed MOFFLE guidelines (77), taking into account the thematic status of MH binyanim and their paradigmatic relationships with respect to valence changing. I argued that when a transitive verb seems to have been derived from its decausative alternate, it was in fact stored in the lexicon as a basic entry. The decausative alternate entered the language first, derived from a frozen transitive verb entry, and was formed in one of the binyanim. The transitive alternate entered the language later on via filling

⁴⁷ There is currently no diachric data with regard to the time PA verbs entered the language. I assume it is similar to the case of MH, where partial data exists, but I leave it for future research.

of the frozen lexical entry, resulting in an actual form. Diachronic evidence suggests some support to this claim as well.

While the proposed analysis is discussed in this study for the transitive-decausative alternation, it can be expanded to other valence-changing operations like reflexivization and reciprocalization or to any cases where there is a mismatch between morphological and thematic relationships. Such mismatches are found within lexical thematic operations but not within syntactic ones. Syntactic derivations tend to manifest a relatively steady morphology, where the direction of derivation correlates with word formation. This lends support to the existence of morphology as an independent component of the grammar that interacts separately with the lexicon and with the syntax. The morphology that applies in the lexicon is rather systematic on the one hand and exhibits some common patterns of word formation, while on the other hand it allows a certain extent of irregularity and idiosyncrasy. In contrast, the morphology that applies in the syntax is much more transparent, predictable, and systematic. The proposed analysis also supports the notion of the mental lexicon as an active component of the grammar that participates both in thematic derivation and in morphological formation. It also supports a view of the lexicon as a system of paradigms of words that are related both thematically and morphologically.

5.4. Summary

Chapter 5 examined the morpho-thematic relationships of MH and PA binyanim with respect to lexical operations. The current picture of the mental lexicon that this chapter leaves us with is as follows. The lexicon consists of paradigms of binyanim that are typical of the different thematic operations. Each operation has one or more paradigms that are typical for its morphological manifestation, but these paradigms are not exception free.

The selection of binyan for verbs that are the output of thematic operations is to some extent predictable but also shows idiosyncrasies and lexical gaps. Furthermore,

there are language-specific morpho-phonological constraints that motivate the selection of one binyan over another.

The direction of derivation in lexical operations tends to be supported by morphology. Most verbs that are thematically derived are also morphologically marked. However, I have also examined cases of apparent morpho-thematic mismatch. Such cases are resolved by assuming the existence of frozen lexical entries. I have argued that verbs that are morphologically marked as derived from their derived counterparts actually started as frozen lexical entries and later on defrosted and received morphological manifestations.

Chapter 6. Morphological Variation and Change

This chapter examines the factors determining morphological variation in the verbal systems of MH. Morphological variation is defined here as a case in which two (or more) verbs that share the same basic meaning, syntactic valence, and stem consonants are constructed in two different binyanim (Moreshet 1976, Laks 2010). This is demonstrated in the examples in (93).

- (93) a. ani zozer ex **nirtavti** ba-gešem haze
'I remember how I got wet in this rain'
(<http://www.cannabis-videos.com/watchthis/F0WWIsIX35E/the-sky-is-crying-for-yitzhak-rabin.html>)
- b. siyamti hayom be-šaloš ve-axar-kax **hitratavti** ba-gešem
'I finished today at three and then I got wet in the rain'
(<http://157.tapuz.co.il/blog/ViewEntry.asp?EntryId=281554andr=1>)

Sentences (93a) and (93b) consist of the verb-forms *nirtavti* and *hitratavti* respectively. Both mean 'get wet' in the past first person singular and both share the stem consonants *r-t-v*. What we have here, then, are two verbs with the same meaning and shared stem consonants, appearing in two distinct verbal configurations.

Why does such variation occur in a language? This chapter addresses such pairs (and sometimes triplets) of verbs that are used interchangeably by speakers. Underlying the study is the assumption that morphological variation derives from a change that takes place in the verbal system, such that a given verb acquires a different form. I argue that this change is as a result of the interaction between morpho-phonological and thematic-syntactic factors. The present study examines these factors, arguing that their interaction is unique to the morpho-phonology that applies in the lexicon, and not in the syntax. The existence of morphological variation undermines a deterministic account of the *binyan* system, which would predict few or no gaps in the system (Arad 2005). If the role of each binyan were unique, fixed, and determined, there would be no reason for the same stem consonants to create two synonymous verbs in different binyanim. The analysis of variation discussed here provides further

support for the relatively low predictability of the morphology of verbs formed in the lexicon, since *binyan* change is hardly if ever attested in the syntax.

This chapter is organized as follows. Section 6.1 discusses the notion of linguistic variation, specifically morphological variation and the type of information that it provides about speakers' knowledge. This section delineates what I mean by morphological variation: criteria are specified to determine which cases do or do not constitute morphological variation, and three cases of variation serve as examples to be given a unified analysis. Section 6.2 outlines four main factors that bring about morphological variation: two relating to the morpho-phonological properties of the verbs that undergo variation (prosodic and segmental alternation) and two that relate to the thematic status and valence of verbs in the lexicon. Section 6.3 draws conclusions in terms of the implications of the study with regard to the interaction between morpho-phonology and the lexicon.⁴⁸

6.1. Morphological Variation

Linguistic variation is inherent in human language and is crucial to the study of the language faculty. The same speaker can use different linguistic forms to express the same meaning, and different speakers of a language can express the same meaning using different forms. Linguistic variation is thus a situation where multiple forms are or can be used to express a single meaning. Specifically to word formation, variation is also known as “overabundance” or “polymorphy”, where a cell within a paradigm can be filled by more than one form, (Anttila 1997); the forms filling the same cell are labeled “doublets” (Kroch 1989, 1994, Taylor 1994, Acquaviva 2008, Embick 2008) or “cell-mates” (Thornton, to appear). For example, the past form of the English verb *burn* can be realized by the doublets (cell-mates) *burned* and *burnt*. Linguistic variation often results from a change that languages undergo at some point in time which, once it occurs, can be maintained within the grammar.

⁴⁸ Since there were only a few examples of variation in PA, this chapter deals mainly with MH. However, the examples that were found suggest that morphological variation in PA is dictated by the same factors that I propose for MH. I leave this issue for future research.

The issue of linguistic variation and change has been addressed by linguists since the 19th century, following Neogrammarian accounts of sound change (Bloomfield 1933, Hinskens et al. 1997). Various studies have associated variation and change with the speaker's competence and considered variation an inherent part of natural language (see Wang 1969, Kiparsky 1968, 1988, 1995, Andersin 1992, Reynolds 1994, Antilla 1997, 2007, Guy 1997, Booij 2002, Bolozky 2003b, Meir 2006, Wedel 2006, 2009, among many others). Linguistic variation and change pose a challenging problem for any linguistic theory that aims to provide a synchronic analysis of linguistic knowledge. A change is by definition a diachronic process, and since intermediate grammars are not final, the status of change and variation is obscure in a deterministic model, where there is no room for random changes (Adam 2002). Consequently, the understanding of processes involving change has since early on been viewed as among the goals of generative linguistics (see, for example, Halle 1962). The study of linguistic change from a synchronic point of view can contribute to linguistic theory by providing a unique perspective on the properties involved in a particular grammatical phenomenon and of the interrelations between them (Macken 1992). A synchronically motivated analysis of change makes it possible to understand the current process that the language undergoes and provides an insight to the factors that are responsible for it. Moreover, variation in speakers' productions reflects speaker competence and so can be taken to represent the grammar (Adam 2002).

Variation has been addressed with regard to paradigmatic relations, where a canonical paradigm is expected to exhibit uniqueness of realization, such that for every stem, each cell in its paradigm must be filled in a unique way (Carstairs 1987, Corbett 2005, 2007a, 2007b). Deviations from canonical paradigms are represented by variation, where a cell is filled by two (or more) synonymous forms (see Thornton 2008, to appear).

Variation is also associated with competition for grammaticality and use under certain approaches. On these views, the grammar generates numerous structures or words that express the same meaning and includes a mechanism for selecting one

winner, and marking the rest as ungrammatical (Embick 2008). This means that if one variant is employed, another is not. This in turn leads naturally to the idea that distinct variants are competing with one another in the grammar (see Weinreich et al. 1968, Pintzuk 1991, Yang 2002). Nevertheless, in some cases more than one competitor are selected as grammatical, with these variants in competition for surface use.

The present analysis considers morphological variation in the verbal system of MH that is the consequence of change, with the goal of demonstrating that such change is in not random, and so can be expressed within a model of the speaker's knowledge. Below, I provide definition of morphological variation and its categories in MH.

6.1.1. Morphological Variation in the Verbal System of MH

Linguistic variation in morphology and other linguistic fields has received a great deal of attention and has been varyingly defined in linguistic research. The present study focuses on a specific type of morphological variation within the verbal system of MH that is captured by the following definition (94).

(94) Morphological variation in the binyan system

Two verbs (or more) occur in (at least) two different binyanim, but must share the same:

- a. stem consonants
- b. thematic grid
- c. denotation

This definition (94) is demonstrated by the two verbs *nirtav* (*niCCaC*) and *hitratev* (*hitCaCeC*) in (93) above: Both share the same stem consonants *r-t-v* (94a), their thematic grid consists of one obligatory thematic role of patient (94b), and they both denote 'get wet' (94c) in the sense that the sentences in which they function as predicates share the same truth conditions and therefore entail each other. As shown in (95), *dan nirtav* and *dan hitratev* are equivalent since they both denote the same event of Dan having got wet.

(95) *dan nirtav* ↔ *dan hitratev* 'Dan got wet'

Note that each verb can have additional meanings, but there is at least one meaning shared by both of them. Compare, for example, the verbs *niftar* and *hitpater* (96) in *niCCaC* and *hitCaCeC* respectively, with the shared stem consonants *p-t-r*.⁴⁹ The verb *niftar* alone has the meaning ‘die, pass away’ (96a), while *hitpater* alone has the meaning of ‘resign (from a job)’ (96b), but the two share the meaning of ‘get rid of’ (96c) and so are interchangeable in this particular context. Such cases of overlapping in meaning also lie in the scope of variation as a linguistic domain.

- (96) a. dan **niftar**/***hitpater** be-seyva tova
 ‘Dan passed away at a ripe old age’
 b. dan **hitpater**/***niftar** ki maca avoda tova yoter
 ‘Dan resigned because he found a better job’
 c. dan sofsot **niftar/hitpater** me-ha-orxim
 ‘Dan finally got rid of the guests’

The two verbs may sometimes differ in register or frequency, but they share the same meaning and both form part of the vocabulary and morphological knowledge of speakers of Hebrew. On the other hand, variation does not refer to cases where one of the verbs has a unique aspectual meaning, e.g. *rac* ‘run’ and *hitrocec* ‘run around’ (97). Both verbs share the same stem consonants and the same thematic grid, but *hitrocec* has an additional aspectual feature of a repetitive action (Berman and Neeman 1994). The sentence *dan hitrocec* ‘Dan ran around’ entails *dan rac* ‘Dan ran’ (97a) but not vice versa, (97b). In this case, the formation of a verb with the same stem consonants in a different binyan makes a difference with regard to their meaning.

- (97) a. dan **hitrocec** ba-gina → dan **rac** ba-gina
 ‘Dan ran around in the garden’ ‘Dan ran in the garden’
 b. dan **rac** ba-gina ↗ dan **hitrocec** ba-gina
 ‘Dan ran in the garden’ ‘Dan ran around in the garden’

⁴⁹ The change from one binyan to another also involves a stop~fricative alternation (e.g. *niftar*~*hitpater*), which is irrelevant for present purposes.

Examples such as (97) do not represent overlapping of meaning and so are not regarded as morphological variation. More generally, the investigation of linguistic variation raises the question whether languages have real or full synonymy. The principle of contrast (Clark 1987, 1993), among others, states that wherever there is a difference in form there is a difference in meaning, so rejecting the notion of synonymy. The present study does not pretend to contribute the issue of whether there is true synonymy or not, but takes synonymy as ranging over truth-conditional criteria, lexical semantics, and pragmatic factors like frequency and register. As noted, discussion here is confined to cases where at least one meaning of the verbal form is identical to at least one meaning of the other verbal form.

6.1.2. Categories of Morphological Variation

The analysis includes different cases of morphological variation that can overlap to some extent, including whether a given *binyan* alternation is stable, occasional, or even erroneous and whether the change is synchronic or diachronic. Instances of variation in the present study were sub-classified on the basis of speaker judgments, and dictionary and online searches into three types: where both verbs are active to speakers (6.1.2.1), where one is viewed as a deviant version of another (6.1.2.2), and cases of diachronic shifts (6.1.2.3). Since speaker judgments often vary, these divisions are not dichotomous but represent general tendencies. For example, some speakers regard verbs like *nirtav* and *hitratev* ‘get wet’ as coexisting, while others view *hitratev* as a deviant form of *nirtav*. Regardless of the type of variation and specific *binyan* forms that change, all cases of change from one *binyan* to another will be shown below to stem from the same factors.

6.1.2.1 Both verbs are active in the speakers' morphological knowledge

The instances of variation presented in this subsection cover the bulk of the data relied on in this study: Pairs or triplets of verbs that meet the definition of variation provided in (94), where both or all three verbs are part of the lexical and morphological knowledge of speakers, and both forms are used interchangeably by different speakers

or even by the same speaker, with no difference in their semantic and syntactic properties. Judgments of MH speakers reveal that they view both forms in each pair in (98) as grammatical.

(98) Morphological variation of verbs

Old form	New form	
takaf	hitkif	'attack'
nisgar	histager	'close oneself'
neʔexar	hitʔaxer	'besmirch'

These examples represent the prototypical type of variation, where any speaker could use either verb to express the same meaning, or in paradigmatic terms, to realize the same cell of a paradigm.

6.1.2.2 *One verb is an "error" of binyan switching*

This case of variation represents a random change of one binyan to another, considered as speakers' unconscious errors of performance. Consider, for example, the near-minimal pair of sentences in (99). In (99a) the correct form of the verb *zara* 'plant' is used in its first person singular past form *zarati* in the *CaCaC* binyan, while in (99b) the speaker uses the same stem consonants but in *hiCCiC*, yielding *hizrati*. Speakers of MH do not view *hizrati* as an actual word in their language, but as the result of replacement of the appropriate form in *CaCaC*.⁵⁰

(99) a. rak **zarati** et ha-garinim šel ha-avatiax, ani mexake še-hu yigdal

'I have just planted the seed of the watermelon, I am waiting for it to grow'
http://groups.zahav.net.il/comm_display_topic_threads.asp?ForumID=25306andTopicID=760487andPagePosition=1 andThreadPage=2andCommID=14861

b. laxen **hizrati** harbe me-ha-garinim šel ha-perot šelanu

'Therefore I planted many of the seeds of our fruits'
<http://forum.kan-naim.co.il/viewtopic.php?f=9andt=215>

The same holds for the *niCCaC* to *hitCaCeC* change in (100). Both sentences (100a) and (100b) express the same meaning, but the reciprocal verb 'met' in the

⁵⁰ This relates only to the meaning of 'plant'. The verb *hizrta* exists in the sense of 'inseminate'.

former is in *niCCaC* (*nifgaš*) while in the latter, it is formed in *hitCaCeC* (*hitpageš*). However, speakers do not judge *hitpageš* as being part of their lexicon, unlike *nifgaš*.

(100) a. mizman lo **nifgašnu**

‘We haven’t met for a long time’

(<http://www.jugend.co.il/gallery/showphoto.php?photo=144428&title=-e0ae-ec-ef-2cee-e6-ee-efec-e0f0-f4-e2-f9-f0-e5&cat=500>)

b. mizman lo **hitpagašnu**

‘We haven’t met for a long time’

(<http://www.kipa.co.il/community/show.asp?Messageid=4052948>)

In (100), the same speaker uses the same verb in two different binyanim within the same sentence, using the MH verb ‘push’ three times. The first two occurrences are different conjugations of the correct form in *CaCaC* (*daxaf*), whereas the third instance *hidxafti* is a conjugation of the incorrect *hiCCiC* variant *hidxif*.

(101) ca?akti ve-**daxafti** ota xazara, hi **daxafa** oti gam, **hidxafti** ota šuv

‘I yelled and pushed her back, she pushed me too, I pushed her again’

(<http://israblog.nana10.co.il/blogread.asp?blog=517488&blogcode=8594709>)

Again, verbs like *hidxif* are not part of the lexicon of most MH speakers, who judge them as ungrammatical.

Although these kinds of forms all represent performance errors rather than the lexical knowledge of (most) speakers, the choice of the erroneous binyan is not random but largely predictable. When speakers unconsciously change the shape of verbs from one binyan to another, the change is not arbitrary and is dictated by the same factors at the focus of this study.

6.1.2.3 Diachronic change

Diachronic change also falls within the domain of morphological variation, referring to verb forms that are relatively old and no longer part of the vocabulary of most speakers. Some speakers do accept them as part of the language, while others view them as archaic forms that are used in high register and mostly restricted to the written language. The verbs *kalaf* and *kilef*, for example, both denote ‘peal’, but the latter is almost exclusive in current use. More such pairs are presented in (102).

(102) Diachronic change of binyan

Old form	New form	
kavas	kibes	'laundry'
yaga	hityagea	'become exhausted'
alav	heʔeliv	'insult'
camak	hictamek	'shrink'

Searches revealed several cases where the old forms in (102) are still accessible to and used by some speakers. The verb *kavas* 'laundry' in *CaCaC* has been almost entirely replaced by *kibes* in *CiCeC*, yet the excerpts in (103) demonstrate a near minimal pair where both verbs are used in their present form with the same complement.

(103) a. ba-sof hu šotef at ha-kelim, mesader et ha-mita ba yašan, **koves** et ha-

bgadim ve-mamšix be-darko la-dira ha-baa

'In the end he washes the dishes, tidies up the bed where he slept, launders his clothes and moves on to the next apartment'

(http://www.fisheye.co.il/3_iron)

b. im ba-yom ha-rišon šel turnir gadol ani menaceax az ani **mexabes** et ha-

bgadim, meyabeš otam ve-ole itam lesaxek gam be-yom šeni

'If I win on the first day of a big match, I launder the clothes, dry them and go to play with them on the second day too'

(<http://every.one.co.il/view.php?t=77548>)

Although most verbs in the left column in (102) are not accessible to most speakers, the fact that they were once an integral part of the language and have changed their binyan assignment is critical to the analysis provided in this study. The claim made here is that the diachronic morphological change of one binyan to another is motivated by the same factors as synchronic change occurs. The analysis proposed below thus aims to integrate synchronic and diachronic perspectives on morphological change and variation.

Note that because binyan change is a dynamic process that consists of several categories, it is impossible to provide the exact number of verbs that change their binyan. However, examination of the current data suggests that there are clear

tendencies with regard to the direction of change, and can predict which changes are likely to occur.

6.2. Factors in Morphological Variation

The present analysis addresses two main questions regarding morphological variation.

(a) Why some verb are more likely than others to undergo binyan change (for example, why does *nirtav* ‘get wet’ changes into *hitratev*, while *hirtiv* ‘make wet’ does not change to **ritev* or **ratav*?). (b) Which *binyanim* are selected as the newer forms of verbs that undergo change? (for example, why has *nirtav* changed into *hitratev* in *hitCaCeC* and not into *CaCaC*, to yield **ratav*?). The answer to question (a) will provide the source and reason of the change and that of question (b) the systematic goal of the change. I will argue that the change is governed by morpho-phonological and thematic-syntactic factors and the interaction between them. That is, *binyan* changes can be predicted to a large extent.

6.2.1. Morpho-phonological Factors

Morpho-phonological factors that cause the change of a binyan are related to the prosodic structure of the inflectional paradigms of binyanim and to segmental alternations of the stem consonants across such paradigms.

6.2.1.1 Reducing prosodic alternation

The *binyanim* *niCCaC* and *CaCaC* are considered as the most marked due to the complex morphology of their inflectional paradigms (Schwarzwald 1996, Bat-El 2001). Unlike the three other *binyanim* -- *CiCeC*, *hitCaCeC* and *hiCCiC* -- verbs in *niCCaC* and *CaCaC* do not preserve the same syllabic structure across their inflectional paradigm (see 4.3.1)

The hierarchy of prosodic markedness that emerges is presented in (104), where the most crucial difference in markedness for present purposes lying between the prosodically non-alternating binyanim, *CiCeC*, *hitCaCeC* and *hiCCiC*, on the one hand, and the prosodically alternating binyanim, *CaCaC* and *niCCaC* (bolded), on the

other. The relative level of markedness of each binyan within these two groups is less significant in the present context (see detailed hierarchy in 4.3.1).

(104) Hierarchy of markedness

CiCeC, hitCaCeC >> hiCCiC >> **niCCaC** >> **CaCaC**

How is prosodic markedness relevant to morphological variation? The proposal made here is that when verbs change binyan, the direction of change is towards a less marked binyan. The change of a binyan can be from *niCCaC* and *CaCaC* to the less marked binyanim *hitCaCeC*, *CiCeC* and *hiCCiC*.⁵¹ In other words, the morphological mechanism, aiming at simplifying the prosodic structure of the verbal paradigms, changes the morphological shape of verbs to binyanim that do not exhibit prosodic alternation. Reducing such alternation makes the verbal system less complex and renders the relations between verbal forms more transparent and perceptually accessible. Note that the binyan change is not fully predictable. It is unclear, for example, why *nirtav* ‘become wet’ changes into *hitratev*, while the decausative verb *nirdam* ‘fall asleep’ does not change into **hitradem*. However, the outcome of the change is predictable, since the new binyan is always prosodically less marked than the older one. It can thus be predicted that verbs formed in *hitCaCeC* (e.g. *hitkamet* ‘get wrinkled’) would not change into a more marked binyan like *niCCaC* (**nikmat*). And in fact, the searches conducted for this study and other instances encountered by the author support the unidirectionality of the change. The only cases I found of change towards a more marked form were in literature and in poetry (see Delmetzky-Fischler 2003, Mor 2003 for illustrations). These are excluded from the present analysis as not representing speakers’ unconscious knowledge and intuitions, but rather a manipulation of language consciously performed by writers.

The examples collected in this study reveal that the most common case of variation is between *niCCaC* and *hitCaCeC*. In addition to reducing prosodic alternation, this

⁵¹ There are also a few cases of a change from *CaCaC* to *niCCaC* and even from *hiCCiC* to *CiCeC* – as in (104) below, although there is no difference between the binyanim in each pair with regard to prosodic alternation.

change is also motivated by a partial morpho-phonological similarity: The two binyanim share the same vocalic pattern in the future and infinitive forms, both at the stem level *CVCVC* and at the prefixed vowel level, as in *yikahel* and *yitkahel* ‘gather around’ (Schwarzwald 2008). This morphemic resemblance makes the transition from *niCCaC* to *hitCaCeC* more transparent and natural and thereby more productive than a transition to other binyanim, since it avoids prosodic alternation while also changing the verbs into binyanim that that manifest maximal structural similarity.

(105) Marked → unmarked binyan change

Old binyan	New binyan	Examples
niCCaC	hitCaCeC	nirkam ~ hitrakem ‘be embroidered’
		nigla ~ hitgala ‘be revealed’
		neʔecav ~ hitʔacev ‘become sad’
CaCaC	hiCCiC	takaf ~ hitkif ‘attack’
		taʔan ~ hitʔin ‘load’
		pasal ~ hifsil ‘disqualify (Trans)’
CaCaC	CiCeC	našak ~ nišek ‘kiss’
CaCaC	niCCaC	acar ~ neʔecar ‘stop’
hiCCiC	CiCeC	hexriv ~ xerev ‘ruin’

Additional support for the direction of binyan change is shown by pairs of verbs formed in both *CaCaC* and *hiCCiC* (106).

(106) Unification of *CaCaC* and *hiCCiC*

CaCaC	hiCCiC
saxar ‘rent’	hiskir ‘let (an apartment)’
šaʔal ‘borrow’	hišʔil ‘lend’
lava ‘borrow (money)’	hilva ‘lend’
xakar ‘lease’	hixkir ‘lease’

The verbs in each pair in (106) are semantically related and are all verbs of transfer. Speakers tend to confuse the two members in each pair, using a single form to convey both the meanings. This confusion, however, is not random, since unification always takes place in *hiCCiC*, not in *CaCaC* - again, in order to avoid prosodic alternation. In the *saxar* and *hiskir* pair, only *hiskir* has the dictionary sense of ‘let (an apartment) to somebody’, but the near-minimal pair of sentences in (107) clearly

indicates that both *saxar* and *hiskir* can be used with the patient sense of ‘rent’ (from somebody). No instances were found where *saxar* was used with the agentive sense of ‘let’, and the same applies to the other verbs in (106). This provides further support for the claim that morphological change in the verbal system is unidirectional and predictable - and, more specifically, directed towards the less prosodically marked forms.

(107) a. šam **hiskir le-acmo dira** ve-halax le-mišteret los-santos lehagiš tifsey rišum
 ‘There he rented an apartment for himself and went to Los Santos police to file registration forms.’
 (<http://forum.vgames.co.il/showthread.php?t=1218581>)

b. hu **saxar le-acmo dira** be-netanya be?emcaut te’udat zehut mezuyefet

‘He rented an apartment for himself in Netanya with a fake ID’
 (<http://www.news1.co.il/ShowTitles.aspx?FirstName=%D7%90%D7%A1%D7%A3andLastName=%D7%95%D7%A7%D7%A0%D7%99%D7%9F>)

The few examples of morphological variation in PA, demonstrate the same direction of change towards more prosodically marked binyan. Specifically, some PA *CaCaC* verbs change into *CaCCaC* or *tCaCCaC* (108).

(108) PA marked → unmarked binyan change

Old Binyan	New Binyan	Examples
CaCaC	CaCCaC	azar ~ azzar ‘reprimand’
		dahan ~ dahhan ‘coat’
		s’a:ħ ~ s’ayyaħ ‘shout’
CaCaC	tCaCCaC	saxan ~ tsaxxan ‘become hot’
		qiwi ~ tqawwa ‘become strong’
		xa:f ~ txawwaf ‘be scared’

6.2.1.2 Reducing consonant alternation (weak verbs)

Weak verbs, which usually have one of the consonants *y* or *v* as a stem consonant, exhibit segmental alternation in their paradigms, making them morphologically defective (Schwarzwald 1977, 1980, 1984, Bat-El 2005a, Sumner 2003). This defectiveness stems from historical phonological processes (e.g. diphthong contraction) that are no longer productive in verb innovation in MH and thus do not constitute an active part of the morpho-phonological knowledge of speakers. Consider,

for example, the pair of verbs *lamad* ‘study’ and *arak* ‘spit’ and their inflectional paradigms in (109). Both verbs are formed in *CaCaC*, but while *lamad* is a “regular verb with the three stem consonants *l-m-d* that surface throughout the paradigm, *arak* is a weak verb, since its initial stem consonant *y* does not surface in the future and infinitive forms.

(109) *CaCaC* regular and irregular paradigms

Tense	Regular paradigm	Irregular paradigm
past	lamad	arak
present	lomed	yorek
future	yilmad	yirak (*yiyrak)
infinitive	lilmod	lirok (*liyrok)

Compare also the pair of verbs *nisraf* ‘be burnt’ and *nolad* ‘be born’, both in *niCCaC* in (110). The verb *nisraf* demonstrates regularity, since all three stem consonants surface throughout the inflectional paradigm, in contrast to *nolad*, which exhibits defectiveness since the stem consonant *v* surfaces only in the future and infinitive forms (*yivaled* ‘be born-Fut.’).⁵²

(110) *niCCaC* regular and irregular paradigms

	Regular paradigm	Irregular paradigm
past	<i>nisraf</i>	<i>nolad</i>
present	<i>nisraf</i>	<i>nolad</i>
future	<i>ysisaref</i>	<i>yivaled</i>
infinitive	<i>lehisaref</i>	<i>lehivaled</i>

Weak verbs like *arak* (109) and *nolad* (110) still exist in Hebrew and their inflectional paradigms remain intact together with their defectiveness with regard to one or more of the stem consonants. However, few such new verbs enter the language, indicating that phonological alternations like these are no longer an active process in MH. Such defective paradigms are frozen in the sense that they are stored as irregularities in the lexicon. Had they been an active part of the grammar, we would

⁵² The occurrence of the vowel *o* in the *niCCaC* prefix, rather than *i*, also stems from a historical diphthong contraction.

expect the morphological component of the grammar to form more such verbs productively.

Since the morpho-phonology of such weak verbs is not an active part of the grammar, many such verbs change into regular forms in other binyanim. The new binyan that is selected allows all stem consonants to surface throughout the entire paradigm. The selected binyanim are *hitCaCeC* and *CiCeC*, where no phonological alternations exist as in *CaCaC* and *niCCaC*. This results in paradigm uniformity (Steriade 1988) in the verbal system, manifested in two ways. First, there is no longer alternation of the stem consonants within the inflectional paradigm of verbs that change their binyan (see 6.2.1.1). Second, some binyanim gradually become less productive and so less common in the language. The verbal system becomes more uniform in the sense that there are fewer binyanim involved in the formation of verbs: Increasingly more verbs in the current lexicon are formed in binyanim like *CiCeC* and *hitCaCeC*, while *CaCaC* and *niCCaC* verbs gradually disappear. In (111), all the “old” verbs in the left column demonstrate defectiveness in at least one form of their inflectional paradigms, whereas the newer forms in the right column show no such consonant alternation

(111) Morphological variation of weak verbs

Old form	New form	
noʔaš	hityaʔeš	‘become desperate’
noʔac	hityaʔec	‘consult (with)’
nosaf	hitvasef	‘be added’
noʔad	hityaʔed	‘be intended’
nosad	hityased	‘be established’
nošan	hityašen	‘age, become outdated’
neʔor	hitʔorer	‘wake up’
yavaš	hityabeš	‘dry (Intrans.)’
ayaf	hitʔayef	‘tire (Intrans.)’
yaʔac	yiʔec	‘consult (Trans.)’
namas	hitnames	‘melt (Intrans.)’

This defectiveness is so opaque that some speakers do not even know how to conjugate some of these verbs properly. The verb *yavaš* ‘become dry’ consists of the

stem consonant *y* that is deleted in the future form (**yiyvaš* → *yivaš*), similarly to the verb *yarak* (109). Out of 12 speakers that were asked to form the future form of *yavaš*, 5 said they couldn't, 3 had to think about it for a few minutes and hesitantly gave the correct answer, and only 2 came up with the correct answer immediately. This kind of variation obviously correlates with various other usage-based factors such as register, literacy, and frequency – variables that are not relevant to this study. Nonetheless, the fact of speakers' hesitation and their inability to conjugate such verbs indicates that the rules underlying these defective paradigms do not constitute an active part of the grammatical knowledge. As a result, speakers change such verbs into binyanim where the stem is transparent throughout the paradigm. In this case, *yavaš* changes into *hitCaCeC* (*hityabeš*), where the stem consonant *y* is never deleted (112).

(112) The verb 'become dry' in different binyanim

	CaCaC (defective paradigm)	hitCaCeC (regular paradigm)
past	y avaš	hityabeš
present	y aveš	mityabeš
future	*yiy baš → <i>yivaš</i>	yityabeš

The fact that defective forms are morphologically neutralized and paradigmatically aligned with other forms provides further support for the role of paradigmatic relations in word formation (Van Marle 1985, Spencer 1988, Corbin 1989, Anderson 1992, Steriade 2000, Stump 2001, McCarthy 2005, Booij 1996, 2008, among others). That is, the morphological system takes into account information not only about the actual verb that is formed but also about its inflection paradigm, avoiding paradigms that incur alternation in the consonants.

Avoidance of consonant alternation also shows that the grammar avoids complexity as much as possible. The morphological mechanism of MH blocks forms that are more complex in the sense that they involve irregularity and have to be memorized. This is related to a more general question, whether or not the grammar contains a general principle regulating how words and phrases interact with one another (Embick and Marantz 2008). Kiparsky (2005) suggests that blocking is

governed by two competing constraints on grammatical expression: Forms should maximize the information to be conveyed and be as economical as possible in their expression of information. Generally, these constraints favor expressions with fewer morphemes and, perhaps, words over multilexemic expressions. While the idea of expression of information is irrelevant to the selection of one MH verbal form over another in the present analysis, the issue of complexity does play a role. Selecting defective forms based on paradigmatic irregularity and inactive morphological rules gives rise to complexity in the morphological mechanism of the grammar. Consequently, such forms are avoided, both in the construction of new verbs and in changing existing defective to non-defective forms.

6.2.1.3 Interim summary

Morphological variation of verbs has been shown to be motivated by a drive to lack of alternation: Verbs constructed in marked binyanim that demonstrate prosodic complexity and paradigm-internal alternation shift to binyanim where no such alternation exists, hence making them less marked. Further, verbs whose stem consonants do not surface throughout the paradigm have a greater chance of changing into other binyanim where all stem consonants surface, making their paradigms more transparent.

The findings presented so far demonstrate the impact of paradigms in the domain of morphological variation, most specifically the important role of paradigmatic uniformity. This means that variation and change need to be considered in the context of whole paradigms, rather than in relation to isolated words. The morphological mechanism conspires to change the binyan value of certain verbs in order to achieve paradigm uniformity in both the prosodic and segmental representation of verbal paradigms. It follows that the underlying causes and behavior of variable forms can best be accounted for in relation to other words in the same paradigm.

6.2.2. Thematic-syntactic Factors

Thematic-syntactic criteria in evaluating morphological change are based on the classification of verbs as transitive or intransitive, their thematic grids and whether they are stored as basic entries or derived by valence changing operations. The next section aims to show that verbs which are the result of valence-changing via lexical operations have a higher chance of undergoing binyan change than those that are basic entries in the lexicon or derived in the syntax.

6.2.2.1 Base vs. derived verbs

MH binyanim are distinct not only in their prosodic patterning and morphological shape, but also to a large extent in their thematic-syntactic status. The relation between binyanim can be expressed largely in terms of valence-changing operations (see Chapter 5). There is a rough division of labor among MH binyanim with regard to valence changing. *CiCeC* and *hiCCiC* are used mostly for verbs that are basic entries, that is, not derived by thematic operations (e.g., *xipes* ‘look for’, *himtin* ‘wait’), while *hitCaCeC* and *niCCaC* typically host predicates that have undergone syntactic reduction as a result of a thematic lexical operation (Reinhart and Siloni 2005).⁵³ The latter two typically serve for derived counterparts of transitive verbs in *CiCeC*, *hiCCiC* and *CaCaC* (e.g., *hitraxec* ‘wash oneself’), alongside of a few decausative, reflexive, or reciprocal verbs without a transitive alternate. For example, the reciprocal verb *hityaded* ‘make friends with’ is derived from the noun *yadid* ‘friend’, but has no transitive counterpart such as **yided*. The fact that decausative, reflexive, and reciprocal verbs are formed directly in *hitCaCeC*, and not only on the basis of transitive verbs in other binyanim strengthens the claim that some verbs are listed in the lexicon as basic entries while others are listed as sub-entries, derived by thematic operations. This supports the claim that the morphological component recognizes which verbs are stored as basic and which as derived entries and selects an appropriate

⁵³ *hiCCiC* is used in the formation of derived entries in cases of causativization. This operation is relatively less productive than the other operations considered in this study, and therefore it is irrelevant to this chapter.

binyan accordingly. *CaCaC* is used for both types of forms, since it is neutral with respect to transitivity (Berman 1978, 1980, Schwarzwald 1981a, 2001a, Ravid 1995). As such, *CaCaC* can host both transitive verbs (e.g. *raxac* ‘wash’) that undergo valence changing and have derived counterparts in other binyanim (e.g. *hitraxec* ‘wash oneself’, derived in *hitCaCeC*), and also intransitive verbs that are the result of valence changing (e.g. *nafal* ‘fall’).

The above classification of the binyanim represents tendencies rather than clearcut dichotomies in the division of labor between them. For example, there is quite a large group of derived verbs in *hiCCiC* and *CiCeC*, e.g., the ones derived from homophonous transitive verbs (such as *hexmir* ‘make/get worse’) and there are also instances of basic entries in *niCCaC* and *hitCaCeC* (e.g. *nitpal* ‘pick on X’, *hitʔalel* ‘abuse’).

Recall that underlying this analysis is the **active lexicon** approach (see 2), under which the lexicon is viewed as an active component of the grammar with regard to two dimensions: morpho-phonology and valence-changing operations.

How is morphological variation related to the notion of “active lexicon”? Most of the verbs that demonstrate variation are forms that are the output of thematic operations such as decausativization, reflexivization and reciprocalization, where they undergo reduction in their syntactic valence. Such operations in Hebrew are assumed to apply in the lexicon (Reinhart and Siloni 2005, Siloni 2008b, to appear), unlike verbal passivization which applies in the syntax (Horvath and Siloni 2008). Consequently, morphological variation of verbs that are derived by lexical thematic operations also takes place in the lexicon. I argue that verbs such as decausatives, reflexives, and reciprocals have a different status in the lexicon than verbs that are basic entries and are not derived by any operation. The morphological component in the lexicon is sensitive to such differences, as illustrated in so that derived forms have a greater chance of undergoing variation (113).

(113) Morphological variation of derived entries

Type of predicate	Examples			
Reflexive	nimtax	~	hitmateax	‘stretch oneself’
	nimrax	~	hitmareax	‘smear X on oneself’
Decausative	neʔexar	~	hitʔaxer	‘become besmirched’
	karav	~	hitkarev	‘become close’
Reciprocal	nifgaš	~	hitpageš	‘meet each other’
	nifrad	~	hitpared	‘break up, separate’

The case of *CaCaC* verbs that undergo change (see 6.2.1.1) provides further evidence for the claim that derived entries are more susceptible to morphological change than basic entries. One motivation to change the binyan of *CaCaC* verbs is to avoid prosodic alternation, as discussed in 6.2.2.1. But many *CaCaC* verbs that undergo change are decausative verbs that are the result of valence-changing, as opposed to *CaCaC* active basic entries that are less subject to change.

Besides, *CaCaC* verbs are subject to change because, as noted, this binyan is not marked with regard to transitivity. The intransitive verb *kafa* ‘become frozen’ is a decausative verb that is derived by a reduction of the thematic role of cause. The search conducted for this study revealed that verbs like *kafa* tend to start changing their form from *CaCaC* into *hitCaCeC* (i.e., *hitakape*, which retains the same meaning of becoming frozen).⁵⁴ Although the variation of verbs like *kafa* is not very common, and many speakers do not accept forms like *hitkape*, the fact that a change into *hitCaCeC* occurs to a greater extent with derived entries strengthens the claim that the morphological mechanism is sensitive to the status of verbs in the lexicon (see 4.2.1 for same claim regarding verb innovation with respect to base and derived forms). *CaCaC* verbs that are basic lexical entries are less likely to undergo variation. Again, the occurrence or variation or lack of it is a tendency rather than absolute: Both basic and derived entries are accessible to this variation, but the chances for it to apply are greater in derived environments. A *CaCaC* basic entry like *sarat* ‘scratch’ is less

⁵⁴ For example *hitkapeti bimkomi* ‘I froze immediately (lit. I froze in my place)’, as in (89) (<http://forum.bgu.co.il/Index.php?showtopic=11721&dst=480>).

likely to undergo variation than one like *kafa* ‘freeze’ - and indeed no morphological variants of this verb (e.g. **siret*) were found in the searches.⁵⁵

So far I have argued that morphological variation is more likely to occur with derived rather than basic forms. Why should this be the case? Why is the morphological mechanism sensitive to the derived/underived status of a verb in the lexicon? I suggest that paradigm uniformity motivates the change of binyan that occurs within derived entries. The morphology of basic entries in the lexicon is less regular and predictable than that of derived entries – because derived entries are derived, both thematically and morphologically, by application operations of valence changing and word formation processes, which assign them a morphological form. Since operations are involved, it makes sense that the morphological output will to some extent be predictable. The morphology of basic entries, on the other hand, is less predictable, since they are not constructed on the basis of a morphological rule – they are simply there as such in the lexicon, conforming to one of the possible binyanim. I suggest that morphological predictability and regularity is based on a scale that yields a continuum, such that the morphology of outputs of lexical thematic operations is less predictable and transparent than that of syntactic operations (Laks 2007a, 2007b), but more predictable than the morphology of basic entries. True, there are some “basic entries” in the lexicon constructed in *binyanim* typically assigned to derived entries (e.g., *hitnakeš* ‘assassinate’ in *hitCaCeC* and *nišba* ‘swear, vow’ in *niCCaC*), but these cannot be regarded as the output of any morphological rule, at least not synchronically, but as accidentally formed in binyanim atypical of basic entries. On the other hand, there are relatively few cases where the morphological mechanism takes a basic entry and forms its derived counterpart in a template that is entirely atypical for such derivations. Of course, there is some degree of irregularity in lexical morphology, as well; for example, an entry that is basic in *hiCCiC* stands an equal chance of having a derived counterpart in either *hitCaCeC* or *niCCaC* (see 5.2 and

⁵⁵ I have so far come across 32 examples of change of derived entries in *CaCaC*, while I have found only 15 examples of basic entries that undergo binyan change.

Laks (2009)). By changing some *niCCaC* forms into *hitCaCeC*, the morphological mechanism achieves paradigm uniformity in valence-changing, making the morphology that applies in the lexicon more systematic and predictable. In sum, the morphology of basic entries in the lexicon is “messier” than the one of derived entries, so that morphological variation is less likely to apply to achieve paradigm uniformity, while the morphology of lexical operations is more predictable, aimed at making the morphological shape of derived entries more typical. This difference in the application of morphological change with regard to basic versus derived forms correlates with paradigm uniformity (Albright 2005). Once a basic entry is assigned a given form, the morphological mechanism allows the remainder of the paradigm to be predicted more accurately and with greater confidence by unifying the shape of derived forms. This echoes Lahiri and Dresher’s (1984) claim that certain forms in the paradigm “matter more than others” to speakers. Although their proposal relates to language acquisition and how learners determine which class a word belongs to, the notion of difference in the status of words within paradigms applies to morphological variation as well, supporting the claim that not all words in a given paradigm are equal in the sense that the grammar, in the case at point morphology, can treat them differently.

Morphological variation is typical of the lexicon, as opposed to the syntax. I argue that morphological variation in MH is restricted to forms that are stored in the lexicon. Thus, verb-forms constructed in the syntax do not undergo variation, as is the case with MH passivization, shown by Horvath and Siloni (2008) to apply in the syntax, in contrast to other valence-changing operations. The morphological patterning of passives supports the claim that passivization applies post-lexically, as distinct from the case of lexical operations. MH passive verbs are generally formed by the morphological process of melodic overwriting (see 3.2.1), in which the vocalic pattern of transitive verbs in *CiCeC* and *hiCCiC* change to *u-a*, to yield the forms *CuCaC* and *huCCaC* respectively, as in (114).

(114) MH passivization via melodic overwriting

Binyan	Active form	Passive form
CiCeC	<i>siper</i> 'tell'	<i>supar</i> 'be told'
	<i>tipel</i> 'take care (of)'	<i>tupal</i> 'be taken care of'
hiCCiC	<i>hiklid</i> 'type'	<i>huklad</i> 'be typed'
	<i>hidgim</i> 'illustrate'	<i>hudgam</i> 'be illustrated'

CuCaC and *huCCaC* passive forms do not undergo morphological change, as is to be expected, since their prosodic structure remains intact throughout their inflectional paradigm, similarly to the prosodic structure of *CiCeC* and *hiCCiC*: The only difference between the two active and passive binyanim is the quality of their vowels. Yet *CuCaC* and *huCCaC* verbs are always derived forms of their active transitive counterparts and so can be expected to undergo variation, at least more than active forms. However, if, as shown in this section, variation is more likely to apply to derived verbs rather than to basic entries, the question is why passive verbs fail to undergo variation. I argue that this is due to the fact that passivization applies in the syntax, so that passive verbs are assumed not to be listed in the lexicon as sub-entries of their active counterparts, in contrast to verbs that are derived via lexical valence-changing operations like decausatives and reflexives.

Verbs in *niCCaC* provide further support for the distinction between lexical versus syntactic derivation, since they differ from passive verbs in *CuCaC* and *huCCaC* in several ways. First, the derived passive counterparts in *niCCaC* of all active verbs in *CaCaC* are not formed by melodic overwriting (see 3.2.1), but by adding a prefix *ni-* (compare active *ganav* 'steal' ~ passive *nignav* 'be-stolen'). Second, while *CuCaC* and *huCCaC* forms are used almost exclusively for passivization, *niCCaC* is unique in that it hosts both passive forms derived from *CaCaC* and other intransitive predicates (e.g., decausatives, reflexives, reciprocals) that are derived from both *CaCaC* and *hiCCiC* (Schwarzwald 2008). Third, *niCCaC* includes lexically derived predicates with no transitive alternate, as well as a few basic entries. In sum, the uniqueness of this binyan is that it hosts predicates that are derived in the lexicon as well as ones derived in the syntax. As noted earlier, many *niCCaC* verbs undergo morphological

variation, both because of the alternation in the prosodic structure of this *binyan* and because many of them are derived predicates. In contrast, *niCCaC* verbs that are strictly passive forms with no other interpretation, such as reflexive or decausative, do not undergo variation at all. Thus a strictly passive verb like *nigzam* ‘be pruned’, derived from *gazam* ‘prune’, has no *hitCaCeC* alternate (**hitgazem*), similarly to all *niCCaC* verbs with an exclusively passive meaning (115), since passive verbs are formed in the syntax so that, similarly to *CuCaC* and *huCCaC*, they are not subject to variation.⁵⁶

(115) *niCCaC* verbs with exclusively passive meaning – no morphological variation

CaCaC active form		Passive form	
gazal	‘rob’	nigzal / *hitgazel	‘be robbed’
šafat	‘judge’	nišpat / *hištāpet	‘be judged’
baʔat	‘kick’	nivʔat / *hitbaʔet	‘be kicked’
laʔas	‘chew’	nilʔas / *hitlaʔes	‘be chewed’

A further consequence of the dual status of *niCCaC* is that verbs derived from *CaCaC* may often be ambiguous between functioning as syntactic passives or as derived by lexical operations, functioning as decausatives, reflexives, or reciprocals. Importantly, as noted, morphological variation is confined only to lexically derived forms but not to the passive forms in *niCCaC*. For example, the *CaCaC* transitive verb *ataf* ‘wrap’ has a derived counterpart in *niCCaC* (*neʔetaf*) that is both passive (‘be wrapped’) and reflexive (‘wrap oneself’). This verb undergoes variation: it also occurs in *hitCaCeC* (*hitʔatef*), but the *hitCaCeC* form has only the reflexive meaning of wrapping oneself with something (116). This provides further support for the division of labor between the lexicon and the syntax with regard to valence-changing operations. When these apply in the lexicon, their output forms are subject to variation, whereas verbs derived in the syntax are not – regardless of how they are formed, by melodic overwriting in *CuCaC* and *huCCaC* or by formation in *niCCaC* *binyan*.

⁵⁶ There are only a few instances of passive verbs formed in both *CuCaC* and *hitCaCeC*, such as *pursam* and *hitparsem*, both denoting ‘be published’.

- (116) a. hu **neʔetaf** be-meʔil gadol, xipes et miškafav...
 ‘He wrapped himself with a big coat, looked for his eyeglasses...’
 (<http://www.haaretz.co.il/hasite/spages/1129321.html>)
- b. hu **hitʔatef** be-meʔil ve-xašav...
 ‘He wrapped himself with a coat and thought...’
 (<http://www.atarnet.net/nodewebimages/24151/Files/sipur-etzim.doc>)
- c. kol psanter **neʔetaf**/***hitʔatef** be-šaloš šxavot
 ‘Every piano was wrapped with three layers’
 (<http://www.gav2.co.il/hovalot.aspx?id=6andl=53>)

As noted, melodic overwriting into *u-a* is confined almost entirely to passive formation, to yield *CuCaC* and *huCCaC* verbs. A few *huCCaC* verbs do, however, have a decausative meaning (Meltzer 2006). For example, the transitive verb *hiksim* ‘charm’ has a derived decausative in *huCCaC* (*huksam* ‘become charmed’) and not in *niCCaC* (**niksam*) or *hitCaCeC* (**hitkasem*), which is the typical form for decausatives⁵⁷. Yet a web search yielded a few instances where the decausative verb *huksam* did undergo variation to *niCCaC*, as illustrated in (117) where *huksam* and *niksam* are used in a very similar context.

- (117) *huCCaC*-*niCCaC* near minimal pair
- a. ani **niksamti** me-ha-sefer
 ‘I was charmed by the book’
 (<http://shirbut.com/blog/?p=594>)
- b. **huksamti** me-ha-sefer, lefaxot bahatxala
 ‘I was charmed by the book, at least at the beginning’
 (<http://www.mako.co.il/news-columns/Article-a56aa53116e1121004.htm>)

Note that cases like (117a), where *huCCaC* forms undergo a change, are indeed rare, but the fact that they occur only when *huCCaC* hosts decausative and not passive predicates strengthens the claim that morphological variation applies to the output of lexical and not syntactic operations.

⁵⁷ Sentences with verbs like *huksam* do not entail the existence of an agent, as in the case of passive verbs (see 2.2.1).

6.2.2.2 Transitivity/intransitivity marking

As mentioned, The *CaCaC* binyan is described as “neutral” with respect to transitivity (Berman 1978, 1993), since it hosts both transitive and intransitive verbs as in (118a) and (118b) respectively.

(118) Types of *CaCaC* Verbs

- a. Transitive verb: *katav* ‘write’, *šata* ‘drink’, *axal* ‘eat’, *maxar* ‘sell’, *kana* ‘buy’
- b. Intransitive verbs: *nafal* ‘fall’, *kafa* ‘freeze’, *naval* ‘wither’, *xalaf* ‘pass, elapse’

The claim here is that in addition to their marked morpho-phonology, some *CaCaC* verbs change binyan in order to be overtly marked as either transitive or intransitive⁵⁸. That is, selection of a new binyan for *CaCaC* verbs coincides with their transitivity values, as follows. First, *CaCaC* transitives change into *CiCeC* or *hiCCiC*, *binyanim* which tend to host mainly transitive verbs (119).⁵⁹

(119) Variation of *CaCaC* transitive verb (*CiCeC* or *hiCCiC*)

Type of variation		Examples		
<i>CaCaC</i>	→ <i>CiCeC</i>	kalaf	~ kilef	‘peel’
<i>CaCaC</i>	→ <i>hiCCiC</i>	takaf	~ hitkif	‘attack’

CaCaC intransitive verbs change into *niCCaC* or *hitCaCeC*, which host mainly derived intransitive verbs (120).⁶⁰

⁵⁸ In cases where an intransitive verb changes into *niCCaC* or *hitCaCeC* there is also a change of aspect in some cases, where the verb is also marked exclusively as inchoative (Blanc 1965, Zuckermann 2009). Still, the two verbs share the inchoative meaning (e.g. *yašav* ‘sit/sit down’ and *hityašev* ‘sit down’).

⁵⁹ There are a few counter-examples where *CaCaC* intransitive verbs change into *hiCCiC*, e.g. *šaman* ‘become fat’ that changes into *hišmin* (*hiCCiC*) and not *hištamen* (*hitCaCeC*) or *nišman* (*niCCaC*) as expected. The change in such cases is morpho-phonologically predictable, since the new binyan is less marked prosodically, but not with respect to transitivity.

⁶⁰ Note that the intransitive *CaCaC* verbs discussed in this section are also derived *entreis* (see 6.2.2.1). The transitive/intransitive distinction provides further motivation for the binyan change and it explains what the “newer” binyan of such verbs can be.

(120) Variation of *CaCaC* intransitive verbs (*niCCaC* or *hitCaCeC*)

Type of variation	Examples
CaCaC → hitCaCeC	namax ~ hitnamex 'become short'
	gavar ~ hitgaber 'increase'
	paxad ~ hitpaxed 'be(come) frightened'
	camak ~ hictamek 'shriveled up'
CaCaC → niCCaC	ratat ~ nirtat 'vibrate'
	azal ~ neʔezal 'become used up'
	karas ~ nikras 'collapse'
	daha ~ nidha 'fade'

Marking the transitivity or intransitivity of verbs is also attested by change of verbs in other binyanim. Such is the case with items in the group of homophonous verbs in *hiCCiC* which are both transitive and intransitive, mainly with verbs derived from adjectives (Rosén 1956). For example, the verb *heʔedim*, from the adjective *adom* 'red', denotes both making something/someone red and becoming red (see Borer 1991). Formation of intransitive verbs in *hiCCiC* is not productive with regard to either existing forms or to new-verb formation, so that it can be considered irregular. A dictionary search reveals that less than 10% *hiCCiC* verbs (52/ 614 = 8.47%) are intransitive, and of these more than half (34/52 = 65.4%) also have a transitive meaning, with very few (only 18 = 2.93%) being only intransitive. Some *hiCCiC* intransitives change to *hitCaCeC* so as to be marked as intransitive (e.g. *hitʔadem* 'redden = become red' in *hitCaCeC*) is common in such cases. This change to *hitCaCeC* never occurs with the transitive occurrence of the same verbs, since *hiCCiC* is a typical form for transitive verbs, so that there is no motivation for change. That is, variation of *hiCCiC* verbs occurs only with the intransitive occurrence, as in (121).

(121) Marking *hiCCiC* verbs as intransitive in *hitCaCeC*

heʔedim	~	hitʔadem	'redden = become red'
hilbin	~	hitlaben	'whiten = become white'
hexvir	~	hitxaver	'pale = become pale'
hikriax	~	hitkareax	'become bald'

Some *hiCCiC* intransitive verbs are marked as intransitive by changing into *niCCaC* (e.g., *higlid* and *niglad* ‘turn into a scab’), but this is far rarer than formation in *hitCaCeC* due to the prosodic properties of *niCCaC* discussed earlier (Section 6.2.2.1). Here too, the morphological mechanism aims at creating paradigm uniformity in the derivational system by dividing verbs into binyanim that have a typical value for transitivity and by neutralizing the fuzziness of transitivity boundaries.

The notion of marking transitivity boundaries is also noted in research on acquisition of MH binyanim and the derivational relations between them. Berman (1980, 1982, 1993 and 2003) observes two main stages of *binyan* switching in the development of derivational relations between verbs. During the initial stage, up to around age three years, a single non-alternating form is used for a given concept, with all thematic realizations of the same concept conflated into a single binyan. For example, children used the *CaCaC* verb *nafal* (‘fall’) both as decausative and transitive (rather than *hipil* ‘make X fall’), with both the concepts of ‘fall’ and ‘make X fall’ expressed by the same morphological shape. At the second stage, around the fourth year, children do alternate *binyan* forms for the same verb, manifesting two main types of switching – between transitive binyanim, *CaCaC* and *hiCCiC* (e.g. *heʔelim* – *ilem* ‘make X vanish’) and between intransitive binyanim, *niCCaC* and *hitCaCeC* (e.g. *nirdam* – *hitradem* ‘fall asleep’).⁶¹ That is, their errors do not cross transitivity boundaries, a finding that is interpreted by Berman as indicating that children demarcate predicates according to their transitivity. This correlates with the division between basic and derived entries in the lexicon since, according to which, putting causativization aside, most transitive verbs are basic entries, while their intransitive counterparts are assumed to be derived by thematic operations (see Reinhart 1996, Horvath and Siloni 2008, 2010a, 2011a).

⁶¹ Children did not use *CaCaC* binyan instead of other binyanim. Berman (1980) regards this binyan as “basic” since it is neutral with respect to transitivity.

Berman's findings show that children have knowledge of the thematic relations between the verbs they use, even at the initial stage, when they lack mastery of the morphology related to these thematic relations. By the second stage, they demonstrate knowledge of the division of morphology between basic and derived entries, and at this point the sentences they construct that require binyan switching are well-formed in inflectional morphology and syntactic structure. It should be borne in mind however, that Berman's two stages represent different phases in the acquisition of verbal morphology, and do not deal with the concepts themselves. I assume that both concepts exist in both stages, but that their morphology has not been fully acquired. In contrast to children, adults always change binyan values in the direction of the unmarked values (see 6.2.2.1 above). Children's *binyan* switching, in contrast, is bidirectional: In the typically intransitive binyanim, they can change both *hitCaCeC* into *niCCaC* (e.g. *hitparek* → *nifrak* 'fall apart') and *niCCaC* into *hitCaCeC* (e.g. *neʔelav* → *hitʔalev* 'become insulted'). The results of this study show that adult speakers are likely to perform only the latter change of binyan.

Section 6.2.2 specified thematic-syntactic criteria that trigger a change of binyan, to demonstrate that the morphological component is sensitive to the status of verbs in the lexicon. Verbs that are stored as derived entries in the lexicon are more likely to undergo variation, with a morphological tendency to avoid vagueness in regard to transitivity. Since verbs are typically morphologically marked as transitive or intransitive, *CaCaC* verbs, as well as a few *hiCCiC* verbs, which are unmarked with respect to transitivity, tend to change their binyan. Finally, morphological variation in the verbal system of MH applies only to lexical outputs.

6.3. Summary

The analysis proposed in this chapter sheds light on the factors that play a role in the constant shiftings manifested by the verbal system of Hebrew. While morphological variation cannot be fully predicted, it demonstrates rather clear trends. Morphophonologically, the change from one binyan to another is always towards less marked

forms in the sense that the morphological mechanisms disfavor forms that demonstrate prosodic or consonantal alternation in a given paradigm. From the thematic-syntactic point of view, the morphological component distinguishes between verbs that are stored in the lexicon as base versus derived entries. Derived forms that are the result of valence-changing operations have a greater chance of changing binyan. Further, the morphological component aims at marking verbs as transitive or intransitive, as shown by the fact that verbs in *CaCaC* – as the only *binyan* that can be described as neutral with regard to transitivity – shift to other binyanim that have a more unequivocal status as transitive or intransitive.

Morphological change is shown here to apply to verbs stored in the lexicon either as basic or as derived entries, in contrast to passive verbs that are assumed to be derived in the syntax. This does not mean, of course, that variation cannot occur to syntactic outputs, but at least with regard to verb formation, there is a clear difference in the morphological behavior of forms constructed in the two components of the grammar. This analysis lends further support to the unique nature of morphophonology associated with the lexicon, while taking into account both morphophonological and thematic-syntactic considerations.

Chapter 7. Blocking Effects on Valence Changing

This chapter addresses cases of morphological blocking, namely, cases where verbs that are conceptually possible and could be derived as a result of valence changing are not derived. I argue that the absence of such verbs in MH and PA is not entirely arbitrary, but rather, stems from morpho-phonological constraints. I examine four cases of blocking effects in MH and PA and provide an explanation as to why verbs that are conceptually possible do not exist in one of the two languages. Analysis of the four cases provides support to the three claims that are advanced in this dissertation.

First, I argue that morpho-phonological constraints restrict the application of thematic operations, thus resulting in lexical gaps. Theoretically possible but non-existing verbs result either from the violation of the Obligatory Counter Principle (7.2 and 7.3), or from avoiding the application of morphological processes that are not active in the language (7.4 and 7.5).

Second, I contend that blocking effects on valence changing occur only when such operations apply in the lexicon, and not in the syntax. When the word formation mechanism encounters the same morpho-phonological structures in the syntax, there is no blocking of word formation. This distinction provides further support for the existence of two types of morphology, and for the position of morphology as an independent component of the grammar that interacts separately with the lexicon and the syntax.

Third, I claim that a word-based view provides a better account of the application of morpho-phonological constraints on valence changing. In such an approach, words are formed directly from existing words based on internal stem modifications. Specifically for languages such as MH and PA, there is no separate reference to a consonantal root, and this undermines claims that it has no independent existence. The morphological component of the grammar has to examine the output forms and their relations.

I begin by a general discussion of the productivity of valence changing (7.1), then turn to the four case studies (7.2-7.5) and then turn to general conclusions.

7.1. Productivity of Valence Changing Operations

The productivity of valence changing operations varies both cross-linguistically as well as within the same language among different operations. In general, valence changing operations do not apply uniformly. There are verbs that have derived counterparts as a result of the manipulation of their thematic grid, but there are others that do not have such alternates. Compare, for example, the two transitive English verbs *hug* and *push*, where only the former has an intransitive reciprocal alternate (122).

- (122) a. John and Mary hugged each other.
b. John and Mary hugged.
c. John and Mary pushed each other.
d. * John and Mary pushed.

Lexical operations are relatively less productive than syntactic ones, as gaps and exceptions can be listed (see 3.2.6). Syntactic operations, like MH passivization, apply across the board and are hardly subject to any irregularities.⁶² Examine MH reflexivization in (123), for example. The transitive verbs *raxac* ‘wash’ and *siken* ‘jeopardize’ have reflexive counterparts (*hitraxec* and *histaken* respectively), while the transitive verb *yiceg* ‘represent’ has no such counterpart. The same is true for the gaps in PA passivization. The verb *katab* ‘write’ has a passive counterpart *inkatab* (124ab), while according to most judgments, the verb *axad* ‘take’ has no derived passive alternate that denotes ‘be taken’ (124ad).⁶³

⁶² This does not mean that gaps in MH passive formation do not exist (see Landau 2002 and Doron 2003), but that passivization is relatively much more productive, exceptions are rare, and they can be explained by other factors.

⁶³ The MH and PA data are also based on judgments of 30 native speakers of each language between the ages of 16-44.

(123) MH reflexivization (*CaCaC/CiCeC – hitCaCeC*):

- a. dan raxac/siken et acmo
'Dan washed/jeopardized himself'
- b. dan hitraxec/histaken
'Dan washed' / 'Dan jeopardized himself'
- c. Dan yiceg et acmo
'Dan represented himself'
- d. *dan hityaceg
'Dan represented himself'

(124) PA passivization (*CaCaC- inCaCaC*):

- a. il-walad katab il-kita:b
'The boy wrote the book'
- b. il-kta:b inkatab
'The book was written'
- c. il-walad axad il-kita:b
'The boy took the book'
- d. (?) il-kita:b inaxad
'The book was taken'

Why are verbs like MH's 'represent oneself' (123d) and PA's 'be taken' (123d) missing from the derivational paradigms? Measuring the productivity of valence changing operations is based on the actual formation of verbs through operations that result in actual, existing words. In order to reveal the extent to which an operation is productive, one should define its input, that is, to identify which basic entries can actually be candidates for each operation. The input for decausativization and passivization is well defined (see 2.2.1). Every transitive verb is a good candidate for passivization, and every verb whose thematic grid consists of a cause should undergo decausativization. In these cases, there is a clear prediction with regard to which verbs can undergo any of these operations, and which ones cannot. For example, the

transitive verb *yibeš* ‘dry’ (125a) undergoes both passivization (125b), as it is a transitive verb, and decausativization (125c), as its thematic grid consists of a cause and a patient. The transitive verb *niser* ‘saw’ (126a), however, undergoes only passivization (126b) and, as expected, does not undergo decausativization (126c) because its thematic grid consists of an agent and not a cause.

(125) a. dan/ ha-xom yibeš et ha-beged

‘Dan/ the heat dried the cloth’

b. ha-beged yubaš

‘The cloth was dried’

c. ha-beged hityabeš

‘The cloth dried’

(126) a. dan niser et ha-kise

‘Dan sawed the chair’

b. ha-kise nusar

‘The chair was sawn’

c. *ha-kise hitnaser

‘The chair sawed’

Predictions with regard to reflexivization and reciprocalization are less clear, as there is no defined set of transitive verbs that are candidates for undergoing these two operations. In general, the input for both operations is transitive verbs whose thematic grid consists of an agent, yet there is no clear definition of which transitive verbs undergo the operations. Examining the set of verbs that undergo one of the two operations cross-linguistically reveals an intuition-based definition of the two sets of verbs. Verbs that undergo reflexivization are mostly grooming verbs such as *wash*, *comb* and *clean*, where the agent acts upon himself. Verbs that undergo reciprocalization denote some kind of social or personal interaction such as *kiss* and *hug*, where two or more agents usually act upon each other. However, the two definitions are quite vague in the sense that they do not provide a definite set of

candidates for the two operations. The verb MH *ximeš* ‘arm’ has the reflexive counterpart of *hitxameš* ‘arm oneself’, although it is not a grooming verb. It is unclear why some transitive verbs have reflexive or reciprocal counterparts while others do not. Indeed, there are some cross-linguistic differences in the application of such operations on certain verbs (see 3.2.6).

Seemingly, a fixed definition for candidates of reflexivization and reciprocalization does not exist. Thus it is impossible to comprehensively explain the gaps in the formation of reflexives and reciprocals. As such, I will focus on decausativization and lexical passivization, as in these cases there are clear predictions with regard to the transitive verbs that can be the input of such operations and which ones cannot. As shown in this section, the group of verbs that are supposed to undergo the two operations is easy to recognize by their thematic grids. This makes it possible to detect lexical gaps where certain verbs are definitely expected to undergo one or more of these operations, but fail to do so.

Note that according to some approaches to blocking, competition makes some forms impossible only because other forms happen to exist and beat them (see Aronoff 1994b, Bresnan 2001, Giegerich 2001, Kiparsky 2005, Embick 2007 and Embick and Marantz 2008). In this study, I relate to blocking effects in the sense of words that are conceptually possible but are not formed at all, not because of competition with other words.

What is it, then, that restricts the application of such operations and prevents the formation of theoretically possible verbs? I turn now to the four cases of lexical gaps, where I show that the lack of application of valence changing seems more than a mere coincidence and can only be accounted for by morpho-phonology.

7.2. Gaps in the MH *CiCeC-hitCaCeC* Paradigm

7.2.1. Blocking of *hitCaCeC* Formation Due to OCP

The *CiCeC-hitCaCeC* paradigm is considered to be very productive in verb formation and valence changing operations (see Chapter 4 and Chapter 5). *CiCeC* usually hosts

transitive verbs that are basic entries in the lexicon, while *hitCaCeC* is mainly used for the formation of derived verbs such as decausatives (127127a), reflexives (127127b), and reciprocals (127127c), which are formed by a reduction of the syntactic valence of transitive verbs.

(127) *CiCeC*-*hitCaCeC* derivations

Type of operation	Basic entry		Derived verb	
a. Decausativization	ximem	'make warm'	hitxamem	'become warm'
b. Reflexivization	nigev	'wipe'	hitnagev	'wipe oneself'
c. Reciprocalization	xibek	'hug'	hitxabek	'hug each other'

As noted in 7.1, I will focus mainly on decausativization within the *CiCeC*-*hitCaCeC* paradigm. A dictionary search reveals that almost every *CiCeC* transitive verb with a thematic role of cause in its thematic grid, indeed has a decausative counterpart. When are gaps found within this paradigm? The search shows that gaps exist almost exclusively when the initial stem consonant is *t* or *d*. Out of 220 *CiCeC* transitive verbs that are candidates for decausativization, only 30 (14%) of them do not have a derived decausative counterpart in *hitCaCeC*. Out of these 30, 11 (37%) have a derived decausative counterpart in *CaCaC* or *niCCaC*, while 19 (63%) have no decausative counterpart at all. The transitive counterparts of 16 (84%) of these 19 non-existing verbs begin with *t* or *d* (128). In addition, out of 22 *CiCeC* verbs that begin with *t* or *d*, only 6 (38%) have decausative counterparts in *hitCaCeC*. This suggests that the gaps are not accidental but are motivated by morpho-phonology. Examining each of them reveals that there is no conceptual problem in deriving decausative counterparts. Note that some of the verbs in the column of the derived form are marked with a question mark, rather than an asterisk. This is because there was variation within speakers' judgments regarding these forms. While most speakers viewed them as non-existing words, some accepted them⁶⁴. Nevertheless, there was no such variation with regard to candidates for decausativization whose initial stem

⁶⁴ Out of 30 MH speakers, at least 28 (93%) judged the verbs marked with an asterisk as ungrammatical, while at least 19 (63%) judged the verbs marked with a question mark as ungrammatical.

consonant is not *d* or *t*. The fact that there was variation only with regard to these forms shows that the above phonological constraint of homorganic clusters plays a role in verb formation.

(128) Blocking of *hitCaCeC* formation

Transitive base		Non-existing decausative/passive form	
dike	'make depressed'	*hitdeke / (?)hidake	'get depressed'
timtem	'drive mad'	*hittamtem / (?) hitamtem	'become mad'
tirter	'rattle'	*hittarter / (?) hitarter	'become rattled'
tinef	'make filthy'	*hittanef / hitanef	'become filthy'
tirped	'torpedo'	*hittareped/*hitarped	'get torpedoed'
tiskel	'frustrate'	*hittaskel / (?) hitaskel	'become frustrated'
tiyev	'improve'	*hittayev/ *hitayev	'get improved'
tiʔatea	'trick'	*hittaʔatea/*hitaʔatea	'get tricked'

The verbs in (128) are transitive verbs that are excellent candidates for decausativization. Nevertheless, they have no decausative counterparts. Why is it so? In all examples in (128), forming a verb in *hitCaCeC* yields homorganic clusters /*tt*/ or /*dt*/ as the *hit-* prefix of this binyan ends with *t*, violating the OCP that prohibits identical consonants or adjacent identical features (see 5.2.1). Such clusters are prohibited in MH and are dealt with by deletion of the first consonant, namely the *t* of the binyan prefix.

More specifically, compare the pair of *CiCeC* transitive verbs *lixlex* 'make dirty' (129a) and *tinef* 'make filthy' (129c). The two verbs share the same thematic grid that consists of a cause and a patient, and their semantics is rather similar. Yet, only *lixlex* has a decausative alternate in *hitCaCeC* *hitlaxlex* 'become dirty' (129b), and there is no verb that means 'become filthy' (**hitanef/hittanef*) (129d).

(129) MH decausativization (*CiCeC*- *hitCaCeC*):

- a. dan lixlex et ha-xeder
'Dan made the room dirty'
- b. ha-xeder hitlaxlex
'The room became dirty'

- c. dan tinef at ha-xeder
‘Dan made the room filthy’
- d. *ha-xeder hittanef/hitanef
‘The room became filthy’

Blocking the formation of decausative counterparts for verbs like ‘make filthy’ is motivated by two related factors. On the one hand, such formation could yield a homorganic cluster *tt* (**hittanef*), which is prohibited according to the OCP (see 5.2.1). On the other hand, this violation could be fixed by applying a phonological process of consonant deletion (**hitanef*). The morphological component both avoids violating a phonological constraint, and tries to avoid the application of deletion. It escapes these two operations and, thus, the formation of a possible predicate is blocked. This near minimal pair of transitive verbs, one with a decausative alternate and another without one, illustrates my claim that the lexical gap is not accidental.

In addition, the two are grooming verbs (*tipeax* ‘beautify’ and *digem* ‘straighten up’) that seem to be natural candidates for reflexivization, as they are similar to other *CiCeC* grooming verbs that have reflexive counterparts (e.g. *nigev* ‘wipe’, *iper* ‘put make up’ and *serek* ‘comb’). However, these two verbs do not undergo reflexivization, and these gaps seem to be derived from the same constraint on a homorganic cluster (**hi(t)tapeax* ‘beautigy oneself’, **hi(t)dagem* ‘get straightened up’). As noted in 7.1, it is impossible to provide complete predications with regard to the application of reflexivization. Nevertheless, the fact that the two typical candidates that do not undergo this operation begin with *t* or *d* strengthens the claim that the morpho-phonology is partially responsible for lexical gaps. There are no other grooming verbs in *CiCeC* without a reflexive counterpart in *hitCaCeC*.

Furthermore, a few *CiCeC* verbs that begin with *d* have intransitive alternates in *niCCaC*. The *CiCeC-niCCaC* paradigm is very rare and such formations are present only in cases where the *hitCaCeC* formation is blocked due to morpho-phonological reasons. In this case, a morphologically marked form is selected and an unmarked

form is blocked (see Kiparsky 1973). The verb *diber* ‘talk’, for instance, has a derived reciprocal alternate in *niCCaC* (*nidbar* ‘talk to one another’) rather than in *hitCaCeC* (**hitdaber/ *hidaber*) probably for this reason.

7.2.2. Syntax: No blocking Due to OCP

The prohibition on a homorganic cluster is not restricted to the lexicon. It can also be found in inflection in the syntax when some pronoun suffixes that begin with *t* are agglutinated to the past form of verbs. When the last consonant of the stem is not *t* or *d*, the first person singular past suffix is added to the stem and no violation occurs (130a). When the stem ends with *t* or *d* and this suffix is agglutinated, a prohibited homorganic cluster of */tt/* or */dt/* is formed (130b). However, there is no blocking of the inflection of the first person singular, nor is there for other pronouns whose suffixes begin with *t* or *d*. In this case, the morphological component finds a way to fix this violation by either consonant deletion, or, vowel epenthesis to break the prohibited cluster. There is free variation with regard to the mending strategy that is selected, but in any event, the consonant cluster does not surface.

(130) *CiCeC* past inflection

3rd person form	1st person form	
a. Inflection of regular verbs		
siper	siparti	‘tell’
diber	dibarti	‘speak’
b. Inflection of verbs that end with t or d		
kimet	kimateti / kimati (*kimatti)	‘wrinkle’
kibed	kibadeti / kibati (*kibadti)	‘respect’

The OCP is active in both the derivation of decausatives in the lexicon and within verb inflection that applies in the syntax. The morphological mechanism is faced with the same forbidden cluster in both cases, but the way it copes with it is different in each case. Note that the fixing strategy of consonant deletion is accessible both in the lexicon and in the syntax. Consonant deletion applies in the formation of a few decausative forms in the lexicon (e.g. *hidarder* ‘get deteriorated’, where the *t* of the

prefix is deleted). Nonetheless, despite the existence of such a solution in the lexicon, it is avoided in many cases and verb formation is entirely blocked.

7.2.3. Support for a Word-based Derivation

The case of the blocking effect, where verb formation is prevented due to a homorganic cluster, supports a word-based approach to word formation. It lends support to Correspondence Theory (McCarthy and Prince 1995) that accounts for relations between base and derived forms, and specifically to the concept of output-output correspondence (see Bat-El 1994, Benua 1995, 1997, Burzio 1998, Ussishkin 1999, 2005, Blevins 2005, 2006), according to which there is a strict correlation between the two output forms. The morphological mechanism is required to examine both the output of the base form, i.e. the transitive basic entry in this case, and the derived form, i.e. the decausative counterpart. This ensures that the derived form is faithful to the base and that the relation between them is transparent. *hitCaCeC* is derived from *CiCeC* by agglutinating the prefix /*hit-*/ and changing the first stem vowel from *i* to *e*. Further changes, such as inserting a vowel or deleting a consonant, make *hitCaCeC* less faithful to *CiCeC*. Applying phonological processes like consonant deletion or vowel epenthesis makes the output-output relation less transparent. In the case of consonant deletion, one of the prefix consonants is lost (as in **hitaskel* ‘become frustrated’, instead of **hittaskel*, which has a homorganic cluster), while in the case of vowel epenthesis the syllabic structure, which is typical to *hitCaCeC*, changes from CVCCVCVC (**hittaskel*) to CVCVCVCVC (**hitetaskel*). This shows that the morphological system has to rely on the input and output forms of actual words and the relation between them, rather than inserting a consonantal root into a template. It would be more difficult for a root-based approach to explain such gaps in verb formation, as in such a case, the output-output relation is not taken into consideration.

7.3. Gaps in the PA *CaCaC*-*inCaCaC* Paradigm

PA *CaCaC* is used in the formation of both transitive and intransitive verbs (see Chapter 5). The intransitive derived counterparts of *CaCaC* are formed in *inCaCaC* in cases of passivization and decausativization (131).

(131) *CaCaC* - *inCaCaC* paradigms

Transitive base		Passive/ Decausative	
katab	‘write’	inkatab	‘be written’
kasar	‘break’	inkasar	‘be/become broken’
ʃada	‘infect’	inʃada	‘become infected’
ʃakas	‘reflect’	inʃakas	‘be reflected’
bana	‘build’	inbana	‘be built, get built’
fahas ^f	‘examine’	infahas ^f	‘be examined’

Some *CaCaC* transitive verbs have no intransitive counterpart at all. Again, some of the gaps are idiosyncratic (e.g. *rasam* ‘draw’ - **inrasam* ‘be drawn’), but others are predictable. A dictionary search reveals that apart from two forms, *CaCaC* verbs, whose initial stem consonant is nasal, have no derived counterparts in *inCaCaC*. This is not surprising because such formations would result in an undesired cluster of nasal consonants /nn/ or /nm/.

Examine the two transitive verbs *katab* ‘write’ and *naxab* ‘elect’. The former has a passive counterpart *inkatab* ‘be written’, while the latter does not (**innaxab* ‘be elected’). The formation of verbs like *innaxab* is also blocked by the OCP, similarly to the case of MH blocking in 7.2. In case the first stem consonant is *m*, it would yield a geminate or a homorganic nasal cluster. The possibility of amending this consonant cluster is blocked regardless of the strategy that could be applied. In contrast to MH, geminate is possible in PA. Nasal geminates exist in PA binyanim, e.g. *jannan* ‘drive mad’ in *CaCCaC*. This is allowed due to the fact that both consonants belong to the stem, and there is no need to preserve contrast between the stem and the prefix. A geminate in *inCaCaC* is impossible, as one consonant belongs to the prefix and the other belongs to the stem, as in **innaxab*, and there is coherent boundary between the prefix and the stem.

The undesired nasal cluster in *innaxab* could be amended by deleting one of the nasal consonants (**inaxab*) or inserting a vowel between them (**ininaxab*). However, both mending strategies are avoided, as their application would violate the constraints on prosodic structure in binyan formation that are typical of the verbal system of PA. In the case of consonant deletion, there would be an empty consonant slot, either from that of the prefix, or from the stem while in the case of vowel epenthesis, the vocalic pattern of the binyan is distorted. This means a violation of the constraints on prosodic structure within the verbal paradigms of PA. Thus, the structure of a verb that undergoes deletion or epenthesis would not conform to the structure of any of the possible PA binyanim.

As shown for MH, theoretically possible verbs are not formed due to morpho-phonological constraints. Again, there is no conceptual problem in deriving passive or decausative counterparts for any of the transitive verbs in (132), yet most of them are not formed.

(132) Blocking of *inCaCaC* formation (passivization or decausativization)

Transitive base		Decausative/Passive non-derived form	
mad ^ʕ a	‘sign’	*inmad ^ʕ a	‘be signed’
madaḥ	‘praise’	*inmadaḥ	‘be praised’
manaʾ	‘prevent’	*inmanaʾ	‘be prevented’
manaḥ	‘grant’	*inmanaḥ	‘be granted’
mazaʔ	‘tear, tear up’	(?) inmazaʔ	‘get torn’
nafa	‘deny’	*innafa	‘be denied’
najad	‘rescue’	(?) innajad	‘get rescued’
našal	‘bring up and out, steal’	*innašal	‘be brought up and out, be stolen’
naxab	‘choose’	*innaxab	‘be chosen’

As discussed for the case of MH in 3.1, this blocking effect is also motivated by the OCP. However, in this case the restriction that the OCP poses is different. It prohibits a cluster of two nasal consonants, either identical or different in their place of articulation. This constraint preserves a degree of contrast between the *in-* prefix of the binyan and the stem that begins with a nasal.

As noted for the gap in the *CiCeC-hitCaCeC* formation in MH, some of the decausative verbs in (132) are marked with a question mark rather than an asterisk, as

some speakers accept them as grammatically correct.⁶⁵ However, the gap between the judgments for verbs that begin with nasals and other verbs indicates that the existence of a nasal consonant, for most speakers, poses a problem for the derivation of verbs. In other cases, the morphological component finds a way of deriving such predicates by forming them in a less typical binyan. The verb *našar* ‘spread’, for instance, has a derived counterpart in *iCtaCaC* (*intašar* ‘become spread, published’) rather than in *inCaCaC*, which prevents a homorganic nasal cluster (133a). Although the most typical candidate for the passive or decausative counterparts of *CaCaC* transitive verbs, such formation is blocked and the morphological mechanism ‘escapes’ to *iCtaCaC*. The latter is usually not used for the formation of passive or decausative predicates and mostly hosts predicates such as reflexives or basic entries in the lexicon. The same is true for the verb *nisi* ‘forget’ (133b). Apart from avoiding a /nn/ cluster, there is no reason for its lack of a passive alternate in *inCCaC* (**innasa*). In this case, there is no blocking of passivization and the passive verb is formed in *iCtaCaC* (*intasa* ‘be forgotten’). Although such cases are rare, the fact that they exist only when the initial stem consonant is *n* is not arbitrary.

(133) Atypical *CaCaC*-*iCtaCaC* formation

Transitive base		Decausative/Passive	
a. <i>našar</i>	‘spread, publicize’	<i>intašar</i> / (?) <i>innašar</i>	‘get spread’
b. <i>nisi</i>	‘forget’	<i>intasa</i> / * <i>innasa</i>	‘be forgotten’

Note that cases like (133) are the rare ones. In most cases, both in PA and in MH (see 7.2), there is no use of an atypical binyan, although a homorganic cluster or the application of a phonological process is avoidable that way. This so is because lexical paradigms like the PA *CaCaC-inCaCaC* paradigm and the MH *CiCeC-hitCaCeC* are considerably stable, since the morpho-phonological relations between them are transparent (see 4.3). Forming one binyan from another involves agglutinating a prefix in both languages, and changing the first stem vowels in the case of MH. Both

⁶⁵ Out of 30 PA (Galilee) speakers, 21 (70%) judged them as ungrammatical, 4 (13.5%) said they were not sure and 5 (16.5%) judged them as grammatical.

paradigms are uniform and are hardly subject to irregularities. This demonstrates the role of paradigmatic relations in word formation (Van Marle 1985, Spencer 1988, Corbin 1989, Anderson 1992, Steriade 2000, Stump 2001, McCarthy 2005, Booij 1996, 2008, among others), as it blocks formation in other binyanim.

Similarly to the prohibition of a homorganic cluster in MH, the morphological system encounters a cluster of nasal consonants in PA within inflection in the syntax. This happens when verbs, whose last stem consonant is a nasal, are inflected for first person plural in the past. The suffix *-na* is agglutinated to the stem and the result is an /nn/ or /mn/ cluster (134ab). However, PA allows nasal clusters in inflection.

(134) PA first person plural past inflection

3rd person	1st person plural	
a. Stems that end with a [-nasal]		
katab	katabna	'write'
saraq	saraqna	'steal'
b. Stems that end with a [+nasal]		
sakan	sakanna	'live'
rasam	rasamna	'draw'

The morphological component avoids nasal clusters and blocks verb formation only when formed in the lexicon and, particularly, when the first consonant belongs to the prefix of a binyan and the second is a part of the stem. PA allows a case of no-coherent boundary between a stem and an affix in the syntax, but not in the lexicon. This indicates that the blocking effect, due to a nasal cluster, is not purely phonological due to the OCP. Nasal clusters surface, but not when one of the consonants belongs to a derivational affix that is agglutinated to the stem as part of word formation in the lexicon.

The morphological mechanisms of MH and PA behave differently with regard to the prohibited clusters. MH does not allow homorganic clusters at all. Contrarily, PA allows nasal clusters, but not within the derivation of *inCaCaC* verbs. However, both languages do not allow these clusters as part of verb formation in the lexicon. This provides further evidence that the grammar and, specifically, the morphological

component, shows more sensitivity to processes that apply in the lexicon in comparison to the processes that apply in the syntax.

The case where the same constraint is treated by the grammar differently in the lexicon or in the syntax, correlates with the notion of Lexical Phonology and Morphology (Kiparsky 1982, Mohanan 1986, Booij 1987 and Goldsmith 1993) and with Stratal Optimality Theory (Kiparsky 2000, 2003, see also McCarthy and Prince 1993, Cohn and McCarthy 1994/1998, Kenstowicz 1995, Orgun 1996, Hale et al. 1998, Bermúdez–Otero 1999, Rubach 2000, Itô and Mester 2002, cf. Anttila 2006). The central hypothesis of both theories is that phonological ordering of rules reflects morphological ordering.⁶⁶ Morphology is divided into three levels: stem level, word level and post-lexical level. Morphological and phonological processes apply in tandem within each level. This predicts that phonological processes would interact transparently within a level, but not necessarily across levels, as the levels are serially ordered. Phonological processes can therefore apply in particular morphological levels. Specifically, Anttila (2006) provides evidence from Finnish that the OCP is active in stem phonology, but inactive in post-lexical phonology. Finnish has a constraint that prohibits adjacent fricatives and this constraint blocks assimilation in the sequences /sti/ and /hti/ (135).

(135) Blocking in Finnish due to the OCP (cf. Anttila 2006)

- | | | | | |
|--------------|---|---------|------------|--------------|
| a. hiihtä-i | → | hiihti | (*hiihsi) | ‘ski-PAST’ |
| b. varasta-i | → | varasti | (*varassi) | ‘steal-PAST’ |

In both examples in (135), assibilation should apply within the stem, but, as this would yield a homorganic cluster /hs/ (135a) or /ss/ (135b), it fails to do so. However, the OCP is violated across morpheme boundaries and across words and it does not block vowel deletion, even though it creates homorganic clusters (136).⁶⁷ The same

⁶⁶ The main difference between Lexical Phonology and Stratal Optimality Theory is that the latter has no ordered phonological rules, and, instead, each morphological level is associated with an optimality theoretic phonological grammar (Prince and Smolensky 1993). The analysis proposed in this study can accommodate any of them.

⁶⁷ Both assibilation and vowel deletion in Finnish apply for independent reasons that are irrelevant to this point. See Anttila (2006) for a detailed analysis.

sequences that are blocked in (134) within the stem are not blocked when they occur in different morphemes, e.g., across word-clitic boundaries (136a), and across words (136b).

(136) Non-blocking in Finnish despite the OCP (cf. Anttila 2006)

- | | | | |
|---------------------|---|--------------|--------------------|
| a. piirtä-i-hän | → | piirshän | 'draw-PAST-CLIT' |
| b. kuumenta-i si-tä | → | kuumens sitä | 'heat-PAST it-PAR' |

The data from Finnish provides further support that morpho-phonological constraints apply differently within the lexicon and the syntax. Although the above mentioned theories do not relate specifically to the lexicon or the syntax, they all contend that phonological processes work differently at different levels of representation. The case of Finnish demonstrates how the grammar tackles the OCP differently at different boundaries, inside the stem, as well as outside of it. Similarly, in MH and in PA, the OCP blocks derivation in the lexicon, but not inflection in the syntax.

7.4. Gaps within PA Passive Formation

I assume that PA passivization is lexical based on its low productivity and its morpho-phonological features, as opposed to MH and MSA passivization, which applies in the syntax (see 3.3). There are many PA transitive verbs in *CaCaC* or *CaCCaC* that have no passive counterparts in *inCaCaC* and *tCaCCaC* respectively. Some of these lexical gaps are arbitrary, while others result from the OCP (see 7.3). In addition, PA transitive verbs in other binyanim have no passive alternates. The verbs in (137) are transitive verbs in binyanim such as *iCtaCaC* and *istaCCaC*. They are thematically appropriate candidates for passivization, but have no derived passive counterparts. Note that their MSA counterparts can easily undergo passivization by melodic overwriting, and there are such passive verbs in other languages like MH and English.

(137) Blocking of PA passivization

Binyan	Base	Derived form	MSA passive counterpart	
istaCCaC	istaxraj	-----	ʔustuxrij	‘extract’
	istaqbal	-----	ʔustuqbil	‘welcome’
	istawʕab	-----	ʔustu:ʕib	‘absorb’
	istawrad	-----	ʔustu:rid	‘import’
	istaʔjar	-----	ʔustuʔjir	‘hire’
	istaʕrad ⁶⁸	-----	ʔustuʕrid ⁶⁸	‘review’
iCtaCaC	irtakab	-----	ʔurtukib	‘commit’
	intaqad	-----	ʔuntuqid	‘criticize’
	iqtarah̄	-----	ʔuqturih̄	‘suggest’
	intaxab	-----	ʔuntuxib	‘elect’
tCaCCaC	tbanna	-----	ʔtubunniya	‘adopt’
	tħammal	-----	tħummil	‘bear, stand’
aCCaC	abt ⁶⁸ al	-----	ʔubt ⁶⁸ il	‘cancel, disarm’
	alya	-----	ʔulyiya	‘cancel’

Which factors prevent the formation of such passive verbs? I claim that it is not a coincidence that PA verbs in all binyanim other than *CaCaC* or *CaCCaC* do not have passive counterparts. Such gaps result from morphological complexity that blocks passive formation. Forming such passive verbs in one of the passive binyanim, *inCaCaC* and *tCaCCaC*, would involve a rather complex morpho-phonology. Non-existing but theoretically possible forms such as **inqarah̄* or **tqarrah̄* (‘be suggested’) cannot be derived directly by adding only a prefix from transitive alternates *iqtarah̄* ‘suggest’.⁶⁸ Forming such verbs would also involve an internal change in which the infix /t/ of the binyan is removed in the case of **inqarah̄*. In the case of forming **tqarrah̄* from *iqtarah̄*, the infix is also removed and the base undergoes gemination. In both options, the formation of passive verbs in one of the passive binyanim involves internal changes of the base, i.e., the active form, and not just agglutination of a prefix. The morphological component cannot handle such formations and therefore they are entirely blocked. Note that the same transitive verb *iqtarah̄* ‘suggest’, as well as many others, exist both in MSA and PA. Its passive counterpart can be derived easily in MSA, as this language has a morphological mechanism that can form it. The vocalic pattern changes into *u-i*, and yields *ʔuqturih̄* ‘be suggested’.

⁶⁸ There are a few exceptions such as, *iʔtas⁶⁸ab* ‘rape’ and *inʔas⁶⁸ab* ‘be raped’. I assume such forms are lexicalized and that such formations are not an active part of PA morphology.

In contrast, passive formation of the same verb is blocked in PA for the morphological reason just discussed.

Such a restriction on word formation is typical of derivations that apply in the lexicon, and therefore it provides further support to the claim that PA passivization is lexical. There are far fewer restrictions on thematic operations that apply in the syntax, where the morpho-phonology is more transparent and less subject to constraints (see 3.2).

This case of blocking also supports a stem-modification approach to word formation, rather than assuming root extraction (2.1.2). If verbs in PA were formed by extracting a consonantal root, there would not be a reason for gaps in passive verb formation. Regardless of its binyan, a consonantal root could be extracted from any transitive verb. Examine, for example, the transitive verb *itrakab* ‘commit’, which has no passive counterpart ‘be committed’. There seems to be no morphological restriction on extracting the consonantal root *r-k-b* and inserting it into one of the possible passive binyanim, *inCaCaC* or *tCaCCaC*. This could yield non-existing but theoretically possible forms like **inrakab* or **trakkab* in one of the PA binyanim that host passive verbs. However, the fact that almost no such forms exist, that is, passive verbs are not formed on the basis of any binyan other than *CaCaC* or *CaCCaC*, shows that this process of root extraction does not take place. I contend that this is caused by the fact that there is no such mechanism of root extraction, at all, in the language. Passive verbs are derived directly from their active alternates by applying word formation rules to existing words, when such application is possible. This is performed by stem modification, where the appropriate prefix *in-* or *t-* is agglutinated based on the binyan of the active verb. When the active verb is not in the *CaCaC* or *CaCCaC* binyanim, such agglutination is impossible, as it would result in a verbal form that does not conform to one of the existing binyanim (e.g. **in-irtakab* or **t-irtakab*). Such an analysis gives further rise to a surface-based account in which forms are derived from actually occurring words, as opposed to a system in which forms are derived by relating to an entity that never occurs in isolation on the surface. Reference only to the

consonantal root obscures information about the possibility of forming a passive counterpart to an existing transitive verb (Bat-El 1994, Ussishkin 1999, 2005).

7.5. Gaps within MH Weak Verbs

Weak verbs demonstrate irregular morpho-phonology that is not an active part of the speaker's knowledge (see 6.2.1.2). This section examines verbs that have only two stem consonants and that are formed in different, irregular templates of the binyanim (Schwarzwald 1977, 1980, 1984). As noted in several parts of this dissertation, there is not a one-to-one relation between binyanim with regard to decausativization (see for example, 5.1.1). This is even more prominent in the unique group of MH transitive weak verbs. When decausativization applies, such verbs have different morphological shapes. As shown in (138), when a transitive verb has the prosodic shape of *heCiC*, its decausative counterpart can be formed in several different templates.⁶⁹ Some are formed by reduplication of the second stem consonant in *hitCaCeC* (138a), while others occur in irregular templates such as *niCoC*, *naCoC*, *niCaC* and *CaC* (138b-f). The selection of different templates for the decausative verbs in (138) results from historical reasons. It is impossible to explain synchronically, for example, why the decausative counterpart of *hecil* 'rescue' (138c) is *nical* and not **nacol*, while the decausative counterpart of *hefic* 'disseminate' is *nafoc* and not **nifac*. Both transitive verbs *hecil* and *hefic* share the same prosodic structure and vocalic pattern of *heCiC* and there are no phonological or semantic factors that could account for these differences.

⁶⁹ The prefix is pronounced by some speakers as /he-/ , while other pronounced it as /hi-/. The same change also occurs in the first vowel of some *niCCaC* and *CiCeC* verbs. The selection of either form is irrelevant to this study. See Bolozky (1999, 2003b) for the discussion of the centralization of the vowel in such cases.

(138) Decausativization of weak verbs with irregular morphology

Template	Transitive base	Derived decausative Form
a. Reduplication	heʔir ‘wake X up’	hitʔorer ‘wake up’
b. niCoC	hezik ‘damage’	nizok ‘get damaged’
	hezin ‘nourish’	nizon ‘become nourished’
c. niCaC	hecil ‘rescue’	nical ‘get rescued’
	hecit ‘ignite’	nicat ‘become ignited’
d. naCoC	hefic ‘disseminate’	nafoC ‘become disseminated’
e. CaC	heʔif ‘fly X’	af ‘fly’
	henia ‘move X’	na ‘move’
f. CeC	hemit ‘casue X to die’	met ‘die’

The formation of the verbs in (138) is also exceptional and unproductive in terms of innovation (see Chapter 4). Such templates rarely occur in new verbs that enter the language. I assume such forms are lexicalized and their formation is not part of the morphological component in the lexicon. Indeed, such verbs also tend to undergo morphological variation (see 6.2.1.2) and to be formed in additional binyanim, where all stem consonants surface throughout the entire paradigm.

What about other weak transitive verbs that can thematically be decausativized? As the morphology of verbs in (138) is not productive, it is not attested in other forms. There are two groups of such verbs, each of which demonstrates different patterns.

The first group consists of verbs that undergo decausativization manifested by melodic overwriting (139). Similar to the formation of MH passive verbs, the vocalic pattern of the verbs changes into *u-a*. The formation of MH passive verbs is relatively productive, as almost every transitive verb can turn into a passive one by overwriting its vocalic pattern (see 3.2.6). This type of morphology is considered simple and transparent. It applies quite freely and does not manipulate the prosodic structure of the base form. Due to this high transparency and morphological simplicity, it applies mainly in the syntax. However, it can also apply in the lexicon, especially when there is no other productive way to form predicates by valence changing. The transitive verbs in (139) have no decausative alternates that are formed in one of the templates in (138). The verb *hesit* ‘divert’, for example, could theoretically have a decausative alternate such as **nasot*, **nisot* or **sat* ‘become diverted’. However, since the

formation of such forms is not a part of the speaker's morphological mechanism, it fails to create such forms in addition to the existing ones in (138). Alternatively, the morphological component applies a simpler strategy that is highly common in the language, namely, melodic overwriting, with the vocalic pattern used for passivization. This results in the unification of form of the passive and decausative counterparts of some verbs. The verb *huvax* 'be/become embarrassed', for instance, can be interpreted as both passive and decausative.

(139) Melodic overwriting in decausativization⁷⁰

Transitive base		Decausative derived form	
hetiš	'weaken'	hutaš	'become weakened'
hecif	'flood'	hucaf	'become flooded'
hesiax	'distract'	husax	'become distracted'
hesit	'divert'	husat	'become diverted'

This unification of the two types of verbs is attested in some regular verbs as well. There is a group of decausative verbs with a passive morphology, e.g. *huksam*, derived from *hiksim* 'charm' and *hufta*, derived from *hiftia* 'surprise' (see 6.2.2). Both transitive verbs *hiksim* and *hiftia* do not have derived counterparts in any of the binyanim that are typical for decausativization (e.g. **niksam*, **hitkasem*, **nifta*, **pata*, **hitpatea*). Landau (2002) argues that they have only a decausative interpretation and, thusly, labels them 'fake-passives', while Meltzer (2006) suggests they are both ambiguous and share a passive meaning. Such verbs, as well as the ones in (138), can have a passive meaning when their external argument is interpreted as an agent.

Another group of verbs demonstrates blocking of decausativization. The verbs in (140) do not have a decausative counterpart, neither by changing their vocalic pattern as shown in (139), nor by applying the irregular morphology in (138). I argue that their irregular morphology blocks the application of decausativization. Examining their thematic grids does not explain why they do not undergo this operation, as there

⁷⁰ The verbs in (138) can be classified as decausatives in addition to the possible passive meaning of some of them. Sentences with such verbs do not entail the existence of an agent, as opposed to verbs that are exclusively passive like *supar* 'be told' (see Meltzer-Asscher to appear).

is no observed difference with other verbs that undergo this operation. This results in gaps of the transitive-decausative derivational paradigm.

(140) Morphological blocking of decausativization

Transitive base	Decausative derived form
heʔik 'oppres'	*niʔok, *hitʔokek, *ak, *huʔak
heni 'dissuade'	-----
heʔiv 'darken'	-----
hecik 'hasle'	-----
hegen 'protect'	-----
hexiš 'speed up'	-----

Observe, for example, the verb *heʔik* 'oppres'. Conceptually, there is no reason for it not to have a decausative counterpart denoting 'become oppressed'. This could be performed either by forming such a verb in one of the irregular templates in (138), such as **niʔok* (as applies in *nizok* 'get damaged') or by overwriting its melodic pattern with *u-a*, resulting in **huʔak*. However, none of the alternatives is applied. The result is a lexical gap within the transitive-decausative paradigm.

Similarly to the case of PA passivization in 7.4, the analysis of the data demonstrates that a word-based derivation provides a better account for such cases by allowing the grammar to be as efficient as possible. Root-based theories could account for the formation of weak verbs in two ways. One possibility would be to assume that a root is stored independently in the lexicon and is mapped into binyanim, and, thus, results in morph-phonological alternations. As previous studies have shown (see 2.1), postulating the existence of a root as an entity is problematic by itself. Setting this problem aside, such an approach would have to account for the separate morphological processes that would form each template of the defective verbs separately, since such derived verbs occur in various templates. In addition, weak verbs are identified by their paradigmatic relations (not all stem consonants appear in all the forms in the paradigm), and thus the root itself is insufficient for predicting the unique behavior of the verb. Moreover, the root-based approach would have to assume several constraints that block the application of these processes in case there is no derived form (e.g. *heʔiv*, *heni* (140)).

Assuming root extraction cannot predict why some roots are mapped to one template, while other roots are mapped to another one. In contrast, in a word based derivation, weak verbs are not formed by any morphological process. Both basic and derived entries are stored in the lexicon as thematically related entries. Other weak verbs that are candidates for decausativization either undergo melodic overwriting, which is a rather productive morphological process, or have no decausative counterparts at all. In case a transitive verb has a regular morphology, its decausative alternate can be derived by transparent and productive morphological processes. A word-based account suggests an explanation to why some morphological processes are active and others are not, whereas a root based derivation cannot predict such differences. Such an analysis provides further support for lexicalist approaches to word formation.

7.6. Summary

This chapter reveals the blocking effect of morpho-phonological constraints on lexical thematic operations. It has been shown both for MH decausativization and PA passivization and decausativization that voice gaps are not entirely arbitrary but are, in some cases, the result of blocking by morpho-phonological constraints. Verbs that are conceptually possible are not derived, as such a derivation would result either in the formation of a prohibited homorganic cluster, or, in the application of a phonological process that would make the derived form less faithful to the base form.

The above constraints demonstrate that the morphological component operates directly on words, rather than roots and stems (Bat-El 1994, 2001, Ussishkin 1999, 2005, among others). It has to examine both the base and the derived forms and keep them as faithful as possible to one another by making only minimal changes.

Such restrictions are mostly typical of operations that apply in the lexicon, in contrast to syntactic operations and inflectional processes that apply in the syntax. I have shown in 7.2 and 7.3 that in both languages, MH and PA, verb formation is blocked in the lexicon because of a homorganic cluster, while the same cluster does not prevent verb formation in the syntax. The cluster remains intact in PA inflection

and is mended via vowel epenthesis or consonant deletion in MH. However, in both languages there is no blocking in the formation of the relevant verbs in all their inflectional forms. The lack of blocking is typical to the nature of the syntax, as opposed to that of the lexicon, which is part of the theoretical framework of this study. Syntactic processes are much more productive and are subject to fewer morphological limitations, as all slots of forms, like person and tense, have to be filled (Anderson 1981, 1992). In contrast, the lexicon allows gaps to a greater extent and, therefore, morpho-phonological constraints have a greater impact on word formation in the lexicon. The analysis therefore supports the claim that morphology is an independent component of the grammar that interacts with the lexicon (Aronoff 1976, Anderson 1977, 1992, Scalise 1984, Booij 1996, among others), as it can also be responsible for blocking effects on valence changing. Each of these interactions, with the lexicon and with the syntax, has its own characteristics and limitations.

Chapter 8. Conclusions

This study examined the correlation between valence changing and morpho-phonology, focusing on lexical operations in MH and PA. The study sheds light on the nature of the mental lexicon and the forces that are involved in it.

I assumed that the mental lexicon is an active component that contains actual words. It is active in two independent respects: (i) Morpho-phonological processes apply in it and (ii) It is a computational component where valence changing operations apply. As traditionally argued, the lexicon involves irregularities and idiosyncrasies. This assumption is theoretically plausible as the lexicon at any rate contains finite lists that must and can be acquired. If there are irregularities and idiosyncrasies, the lexicon can list them. The syntax, in contrast, is not an inventory of items. The binyanim system is, to a great extent, chaotic and consists of a great deal of irregularities. The reason for that in my view, is that most of the binyanim are formed by lexical operations (the systematic behavior of the passive MH forms is predicted as they are formed as a result of a syntactic operation). Nonetheless, if operations apply in the lexicon, as argued by the active lexicon approach, one would expect it not to be totally chaotic, but to follow some rules and patterns. I suggested that even the selection of the binyanim that are formed by lexical operations shows certain clear tendencies that can be predicted based on the interaction between thematic-semantic and morpho-phonological factors that do not play a role in the syntax.

The study demonstrated that morpho-phonology is correlated to valence changing in different ways.

The differentiation between basic and derived entries in the lexicon plays a vital role in binyan selection for new verbs that enter both languages along the lines of morpho-phonological criteria (chapter 4). Each language has typical binyan(im) that have a strong tendency to host either basic or derived verbs. Binyan selection in such cases does not usually cross “basicness” boundaries, and in case it does, it can be

accounted for by either morpho-phonological faithfulness constraints or by semantic resemblance to existing forms.

The division of labor between binyanim in exiting forms is less predictable, still there are clear tendencies (Chapter 5). In cases where there are two equal options for binyan selection for derived entries, morpho-phonology favors one binyan.

The interaction between morpho-phonological and thematic-syntactic criteria is dominant in morphological change of verbs. The study examined the phenomenon of morphological variation (Chapter 6), where a verb switches into an additional binyan. The direction of change is well motivated by both morpho-phonological and thematic-syntactic criteria. The change is always towards less marked binyanim where there is neither prosodic nor consonantal alternation throughout their paradigms. Verbs that are stored in the lexicon as derived entries are more prone to morphological change in comparison to basic entries, and both types of verbs in the lexicon have a greater chance of undergoing a change than those verbs which are the output of syntactic operations. Transitivity boundaries are also kept through binyan switching.

Morpho-phonology is also responsible for lexical blocking. There are many basic entries in the lexicon that are excellent candidates for undergoing valence changing, still they fail to do so, resulting in lexical gaps. While some gaps are still left unexplained, it has been shown in Chapter 7 that many of them can be accounted for by morpho-phonological constraints like the OCP or the avoidance of the application of phonological processes ('dead morphology').

The analysis adds to various previous studies that advocate a word-based approach to word formation, and specifically for favoring stem modification over root extraction. Examining the selection of binyan in verb innovation, relations between existing forms, morphological change and blocking of verb formation – all these cases point out that the morphological component in the grammar has to take into account the structure of words and not relate independently to a consonantal root.

The study reveals the special interaction between morpho-phonology and the lexicon in comparison to its interaction with the syntax. This provides further support

to previous studies that advocate the position of morphology as an independent component of the grammar that interfaces with other components.

Appendix I: Verb Innovation in Modern Hebrew

The appendix includes the examples of verb innovation I have collected. *CiCeC* verbs are divided into stem with 3 consonants and stems with more than three consonants.

hiCaCeC verbs are classified according to their thematic-semantic type.

When the base is in another language it is transcribed as it is pronounced in this language, unless it was borrowed into MH. In such cases it is transcribed as pronounced by MH speakers.

1. CiCeC

Base		Derived Verb	
a. 4 or more stem consonants			
1. bablat	'nonsense'	biblet	'speak nonsense'
2. beyca	'egg'	bicbec	'add an egg'
3. bakbuk	'bottle'	bikbek	'put in bottles'
4. baldar	'messenger'	bilder	'work in deliveries'
5. bulšit	'bullshit'	bilšet	'say nonsense'
6. bamba	'Bamba'	bimbem	'eat Bamba'
7. bonbon	'candy'	binben	'eat a candy'
8. barbikyu	'barbeque'	birbek	'have a barbeque'
9. bardak	'mess'	birdek	'make mess'
10. barmen	'barman'	birmen	'work as a barman'
11. barvaz	'duck'	birvez	'walk like a duck'
12. beybisiter	'baby-sitter'	bister	'work as a baby-sitter'
13. blender	'blender'	blinder	'blend'
14. breykdens	'break-dance'	brikdens	'dance a break-dance'
15. cmarmoret	'shivering'	cimrer	'cause shivering'

Base		Derived Verb	
16. cipornayim	'nails'	cipren	'pull out one's nails'
17. carfatit	'French (kiss)'	cirfet	'kiss a French kiss'
18. čarger	'charger'	čirger	'charge'
19. macav-ruax	'bad mood'	civreax	'create a mad mood'
20. čaxčax	'riffraff'	čixčex	'turn into a riffraff'
21. dɪklɛər	'declare'	dikler	'declare'
22. dɪlvər	'deliver (a setup)'	dilver	'deliver'
23. meduplam	'qualified'	diplem	'create high quality'
24. darbuka	'durbakke'	dirbek	'play the durbakke'
25. dɔrsəl	'dorsal (consonant)'	dirsel	'turn a consonant into a dorsal'
26. doxe-yatušim	'anti-mosquito cream'	diyteš	'use anti-mosquito cream'
27. drama	'drama'	drimet / drimtez	'turn into a drama'
28. feysbuk	'facebook'	fisbek/fiyses	'add as a fiend in facebook'
29. fidbek	'feedback'	fidbek	'provide'
30. pikčer	'picture'	fikčer/pikčer	'creat a picture'
31. faks	'fax'	fikses	'send a fax'
32. flocc	'fart'	filcen	'fart'
33. filter	'filter'	filter	'filter'
34. flirt	'flirt'	flirtet	'flirt'
35. fantazyä	'fantasy'	fintez	'fantasize'
36. formæt	'format'	firnet	'format'
37. paršan	'commentator'	firšen	'provide explanations'
38. forwerd	'forward'	firved/firwerd	'forward a message'

Base		Derived Verb	
39. fotošop	'Photoshop'	fišep	'use Photoshop'
40. frizer	'freezer'	frizer	'put in a freezer'
41. galʔin	'kernel'	gilʔen	'stone (a fruit)'
42. greps	'belching '	gireps	'belch '
43. germanu	'German	girmen	'make German'
44. ad-kan	'until-now (not used as a word)'	idken	'update'
45. ignor	'ignore'	igner	'ignore (facebook)'
46. agvaniya	'tomato'	igven	'eat tomato'
47. eksel	'xls file'	iksel	'put in an xls file'
48. ekses	'access file'	ikses	'put in an access file'
49. alergiya	'allergy'	ilerg	'cause an allergy'
50. alunka	'stretcher'	ilnek	'carry X on a stretcher'
51. al-xuš	'no-sense (lit.)'	ilxeš	'anesthetize'
52. omdan	'estimation'	imden	'provide an estimation'
53. omlet	'omelet'	imlet	'prepare an omelet'
54. indeks	'index'	indeks	'put an index'
55. anfalow	'unfollow'	infel	'unfollow (facebook)'
56. apgreyd	'upgrade'	ipgreyd	'upgrade'
57. argaz	'box'	irgez	'put in boxes'
58. arxiv	'archive'	irkev	'put X in an archive'
59. asfur	'Asfur (TV show)'	isfer	'watch Asfur'
60. aškenazi	'Ashkenazi'	išknez	'turn X into Ashkenazi'
61. etgar	'challenge'	itger	'challenge'

Base		Derived Verb	
62. etrog	'citron'	itreg	'handle X with kid gloves'
63. ivrit	'Hebrew'	ivret	'turn a name into Hebrew'
64. ezrax	'citizen'	izreax	turn into a citizen'
65. jagel	'juggle'	jingler/jingel/jigel	'juggle'
66. kablan	'contractor'	kiblen	'take on many jobs (like a contractor)'
67. kacran	'stenographer'	kicren	'type like a stenographer'
68. kukilidea	'ice cream with cookies (name of a brand)'	kikled	'eat Kukilida'
69. kambek	'comeback'	kimbek	'perform a comeback'
70. kumkum	'kettle'	kimkem	'nboil water'
71. kəmpaɪl	'compile'	kimpel	'compile '
72. kampeyn	'campaign'	kimpen	'make a campaign for X'
73. kəmprɛs	'compress'	kimpres	'compress'
74. koncert	'concert'	kincert	'perform a concert'
75. kondom	'condom'	kindem	'use a condom'
76. kənftɣərəiʃən	'configuration'	kinfeg	'create a configuration'
77. kənsəl	'cancel'	kinsel	'cancel'
78. konsept	'concept'	kinsept	'create a concept'
79. korban	'sacrifice'	kirben	'make X a sacrifice'
80. kirkas	'circus'	kirkes	'make a circus out of X'
81. karamel	'caramel'	kirmel	'add caramel'
82. kɔrənɫ	'coronal (consonant)'	kirnel	'make a consonant a coronal'
83. katalog	'catalog'	kitleg	'put into a catalog'
84. katnoa	'mini-bike'	kitnea	'drive a mini-bike'

Base		Derived Verb	
85. krexcen	'complaining'	krixcen	'complain constantly'
86. layk	'like'	liykek	'use the like option (facebook)'
87. layzer	'laser'	liyzer	'use laser'
88. maʔarav	'west'	miʔarev	'make X western'
89. madbeka	'sticker'	midbek	'put a sticker'
90. migdar	'gender'	migder	'classify by gender'
91. magniv	'cool (metaphor)'	mignev	'make cool'
92. magav	'squeegee'	mignev	'use a squeegee'
93. miklat	'shelter'	miklet	'provide a shelter'
94. mekarer	'refrigerator'	mikrer	'put in a refrigerator'
95. malmala	'sheer fabric'	milmel	'create sheer fabric'
96. mimšak	'interface'	mimšek	'create an interface'
97. mamtina	'waiting call'	mimten	'be on hold (telephone)'
98. mingeling	'mingle'	mingel	'mingle'
99. minhara	'tunnel'	minher	'create a tunnel'
100. mankal	'CEO'	minkel	'work as a CEO'
101. manipulacya	'manipulation'	minpel	'manipulate'
102. montaj	'montage (graphics)'	mintej	'perform montage'
103. merj	'merje'	mirjej	'merje (applications)'
104. marker	'marker'	mirker	'highlight'
105. mirmur	'bitterness'	mirmer	'cause bitterness'
106. mesubax	'complicated'	misbex	'make things complicated'
107. maskara	'mascara'	misker	'put on a mascara'

Base		Derived Verb	
108. maslul	'track'	mislel	'model'
109. mašma	'meaning'	mišmea	'provide an additional meaning'
110. misrad	'office'	misred	'turn into an office'
111. misron	'text message'	misren	'send a text message'
112. meser	'message'	misrer	'send a text message'
113. mastul	'high (drugs)'	mistel	'make X high (drugs)'
114. matkot	'Matkot'	mitket	'play Matkot'
115. maxsan	'storeroom'	mixsen	'turn into a storeroom'
116. mayonez	'mayonnaise'	miynez	'add mayonnaise'
117. meytav	'best'	miytev	'make the best out of X'
118. mazgan	'air-condition'	mizgen	'put on air-conditioning'
119. mazleg	'fork'	mizleg	'use a fork'
120. mizraxi	'eastern'	mizreax	'make X eastern'
121. mizron	'mattress'	mizren	'get X into bed'
122. nektar	'nectar'	nikter	'drink nectar'
123. nargila	'narghile'	nirgel	'smoke a narghile'
124. pankek	'pancake'	piknek	'make pancakes'
125. pinceta	'tweezers'	pincet	'remove with tweezers'
126. pingwin	'penguin'	pingwen	'walk like a penguin'
127. poynter	'pointer'	pinter	'use a pointer'
128. parcuř	'face'	pircef	'make faces'
129. parpar	'butterfly'	pirper	'exercise (like a butterfly)'
130. puxlac	'stuffed animal'	pixlec	'stuff an animal'

Base		Derived Verb	
131. postit	'post-it (notes)'	postet	'stick post-it notes'
132. psanter	'piano'	psinter	'play the piano'
133. rolerbleydz	'rollerblades'	ribled	'ride rollerblades'
134. ričrač	'zipper'	ričreč	'zip'
135. rīfreš	'refresh'	rīfreš	'press the refresh button'
136. rēndər	'render'	rinder	'render'
137. ring	'ring'	ringen	'ring'
138. sfaradi	'Sephardic'	sfired	'become Sephardic'
139. šablul	'snail'	šiblel	'dress X up like a snail'
140. sof	'end'	sifsef	'out an end to somebody'
141. safsal	'bench'	sifsel	'sit on a bench'
142. šagrīr	'ambassador'	šīgrer	'represent (like an ambassador)'
143. šokolad	'eat chocolate'	šīkled	'eat chocolate'
144. sikomand	'C-command (syntax)'	sikmend	'C-command'
145. skroul	'scroll'	sikrel	'scroll'
146. šalpuxit	'blister'	šīlpex	'urinate'
147. simen-vi	'mark the letter V'	simnev	'check (a checkbox)'
148. sempel	'sample'	simpel	'sample'
149. senvič	'sandwich'	sīndveč	'make a sandwich'
150. šišlik	'skewered meat'	šīšlek	'grill'
151. sxarxoret	'dizziness'	sīxrer	'make dizzy'
152. šmartaf	'baby-sitter'	šmīrtef	'work as a baby-sitter'
153. šīmuš xozet	'reuse'	šmīxzer	'reuse'

Base		Derived Verb	
154. šnicel	'schnitzel'	šnicel	'eat schnitzel'
155. sponja	'floor washing '	spinjej/sponjej	'wash floor'
156. spoiler	'spoiler'	spiyler/spoyler	'tell a spoiler'
157. sport	'sport'	sportet	'do sports'
158. šrimps	'shrimps	šrimpep	'eat shrimps'
159. status	'status'	stites	'indicate one's status'
160. tokbek	'talkback'	tikbek	'talkback'
161. tafkid	'function'	tifked	'function'
162. tahalix	'process, procedure'	tihalex	'start a procedure'
163. tekstura	'texture'	tikster	'create a texture'
164. takwandu	'taekwondo'	tikwend	'perform taekwondo'
165. telefon	'telephone'	tilfen	'telephone'
166. telepatya	'telepathy'	tilpet	'perform telepathy'
167. teleprompter	'teleprompter'	tilpremt	'use a teleprompter'
168. tampon	'tampon'	timpen	'use a tampon'
169. temperatura	'temperature'	timprer	'put in the right temperature'
170. tamric	'incentive'	timrec	'provide an incentive'
171. motivacya	'motivation'	timvec	'create motivation'
172. tamxir	'pricing'	timxer	'fix a price'
173. tarmil	'backpack'	tirmel	'take a trip of backpackers'
174. torpedo	'torpedo'	tirped	'torpedo'
175. tarxan	'bothersome'	tirxen	'be bothersome'
176. tavlin	'spice'	tivlen	'spice'

Base		Derived Verb	
177. taxbula	'trick'	tixbel	'trick'
178. taxles	'practically'	tixles	'make X practical'
179. taxšit	'jewelry'	tixšet	'be used as a jewelry'
180. tazkir	'reminder'	tizker	'remind'
181. tizmoret	'orchestra'	tizmer	'make sounds'
182. tremp	'ride'	trimpep	'take a ride'
183. trænsfær	'transfer'	trinsfer	'transfer'
184. vazelin	'Vaseline'	vizlen	'use Vaseline'
185. xacocra	'trumpet'	xicrec	'play the trumpet'
186. xefex	'item'	xifcen	'make X a useless item'
187. xaltura	'moonlighting'	xilter	'moonlight'
188. calaxot	'plates'	cilxet	'put in plates'
189. xilazon	'snail'	xilzen	'act like a snail (be slow)'
190. xamcan	'oxygen'	ximcen	'oxidize'
191. xamicer	'Hamitzer'	ximcer	'solve a Hamitzer riddle'
192. xipes+esemes	'search via sms'	xipses	'search with sms service'
193. yom+huledet	'birthday'	yimled	'organize a birthday party'
194. myau	'miao'	yimyem	'make a miao sound'
195. yarkon	'Yarkon (river)'	yirken	'walk near the Yarkon river'
196. yašnuni	'sleepy'	yišnen	'make sleepy'
197. zugles	'someone without a partner'	zigles	'be single'
198. zap	'zap'	zipzep	'zap'

Base		Derived Verb	
b. 3 stem consonants			
1. babelz	‘bubbles’	bibel	‘make bubbles’
2. bacal	‘onion’	bicel	‘add onion’
3. bacal	‘onion’	biclec	‘add onion’
4. bojule	‘Beaujolais’	bijel	‘drink Beaujolais wine’
5. bluf	‘bluf’	bilef	‘bluf’
6. beynoni	‘mediocre’	binen	‘make X mediocre’
7. bis	‘bite’	bisbes	‘take many bites’
8. beten	‘abdomen’	biten	‘add an internal layer’
9. bima	‘stage’	biyem	‘direct (a play)’
10. biyuv	‘sewage’	biyev	‘fix the sewage’
11. bizar	‘bizarre’	bizer	‘make X bizarre’
12. čips	‘chips’	čipep	‘take some chips’
13. cabar	‘Tsabar’	ciber	‘turn into a Tsabar’
14. cama	‘braid’	cime	‘make braids’
15. cinor	‘pipe’	ciner	‘install a pipe’
16. čupar	‘bonus’	čiper	‘give a bonus’
17. čet	‘chat’	čitet/čotet	‘chat’
18. deb	‘Deb (music)’	dibdeb	‘make music sound like dubbing’
19. dibag	‘debug’	dibeg	‘debug’
20. daf	‘page’	difdef	‘turn a page’
21. dijey (DJ)	‘DJ’	dija/ dije	‘work as a DJ’
22. dak	‘thin’	dikek	‘make thin’

Base		Derived Verb	
23. dilit	'delete'	dilet	'delete'
24. davar	'postman'	diver	'deliver post'
25. dvaš	'honey'	diveš	'add honey'
26. davša	'pedal'	diveš	'ride the bike'
27. dayal	'flight attendant'	diyel	'work as a flight attendant'
28. deyt	'date'	diyeyt	'go out on a date'
29. fičerim	'features'	fičer	'add features'
30. fokus	'focus'	fikes	'focus'
31. fimo	'Fimo'	fime	'use Fimo'
32. fan	'fun'	finfen	'give X a good time'
33. fen	'fan'	finfen	'use a fan'
34. fason	'image, look'	fisen	'project a certain image'
35. gader	'fence'	gider	'fence'
36. gugel	'Google'	gigel / gogel	'google something up'
37. glida	icecream	giled	'eat ice cream'
38. grass	'grass (drug)'	gires	'smoke Hashish'
39. griz	'grease'	girez	'grease'
40. gišer	'bridge'	gišer	'bridge'
41. gaz	'gas'	gizez	'create gas'
42. hagig	'literary thought'	higeg	'think literary thoughts'
43. adoni	'sir'	idnen	'call X sir'
44. aguna	'refused to be granted a divorce'	igen	'refuse to divorce'
45. amud	'page'	imed	'lay out'

Base		Derived Verb	
46. aron	'closet'	iren	'put in a closet'
47. janana	'craziness'	jinen	'drive mad'
48. kečep	'ketchup'	kičep	'add ketchup'
49. kihar	'square (city)'	kiker	'create a square'
50. kelev	'dog'	kilev	'provide bad conditions (of a dog)'
51. kolav	'hanger'	kilev	'hang'
52. kemax	'flour'	kimeax	'use flour'
53. kaman	'intelligence officer (acronym)'	kimen	'be an intelligence officer'
54. kanada	'Canada'	kined	'turn into Canadian'
55. kapit	'tea spoon'	kipet	'eat with a tea spoon'
56. kruv	'cabbage'	kirev	'add cabbage'
57. kis	'pocket'	kiyes	'pickpocket'
58. kizam	'toothpick'	kiysem	'use a toothpick'
59. kod	'code'	koded	'code'
60. model	'model'	midel	'make a model of X'
61. madona	'a Madonna microphone'	miden	'use a Madonna microphone'
62. mador	'section'	mider	'prevent X from knowing'
63. megera	'drawer'	miger	'put in a drawer'
64. moked	'focus'	miked	'focus'
65. makaf	'hyphen'	mikef	'hyphenate'
66. mexona	'machine'	miken	'mechanize'
67. minun	'dosage'	minen	'use the right dosage'
68. mesej	'message'	misej	'massage'

Base		Derived Verb	
69. mašov	'feedback'	mišev	'provide feedback'
70. muxta	'snot'	mixet	'spit a snot'
71. nagar	'carpenter'	niger	'drill someone's brain'
72. menuval	'bastard'	nivel	'turn into a bastard'
73. naxs	'very bad'	nixes	'bring bad luck'
74. ot	'signal'	otet	'signal'
75. pica	'pizza'	pice	'eat pizza'
76. pidef	'pdf file'	pidef	'create a pdf file'
77. pedal	'pedal'	pidel/ fidel	'pedal'
78. pudra	'powder (cosmetics)'	pider	'powder'
79. pawz	'pause'	piʔez	'pause'
80. poliš	'polish'	pileš/ fileš	'polish (floor, windows)'
81. panika	'panic'	pinek	'cause panic'
82. panasim	'black eyes'	pines	'create black eyes'
83. parsas	'U turn'	pirses / pirse	'make a U turn'
84. parva	'fur'	pirve	'make X full of fur'
85. pasta	pasta	piste	'prepare pasta'
86. petek	'note'	pitek	'put a note on'
87. patiš	'hammer'	piteš	'use a hammer'
88. pax	'garbage can'	pisex	'through into the garbage'
89. paytan	'liturgical poet'	piyet	'write poetry'
90. postit	'post it (notes)'	postet	'put on post-it notes'
91. ribua	'square (geometry)'	ribea	'turn into a square'

Base		Derived Verb	
92. rebeys	'rebase'	ribes	'rebase'
93. rimuv	'remove'	rimev	'remove'
94. rap	'rap'	riprep	'sing rap'
95. riset	'reset'	riset	'reset'
96. rotev	'sauce'	ritev	'add sauce'
97. rir	'saliva'	riyer	'drool'
98. šamay	'appraiser'	šime	'provide an estimation'
99. sabal	'porter'	sibel	'carry things like a porter'
100. ša?ava	'wax'	ši?ev	'use wax'
101. sika	'clip'	sikek	'clip X together'
102. sakit	'plastic bag'	siket	'put in a plastic bag'
103. skrol	'scroll'	sikrel	'scroll'
104. soler	'diesel fuel'	siler	'use diesel fuel'
105. salsa	'Salsa'	siles	'dance a Salsa dance'
106. salat	'salad'	silet	'add salad'
107. šamay	'appraiser'	šime	'provide an estimation'
108. esemes	'text message (sms)'	simes	'send a text message'
109. šampo	'shampoo'	šimpe	'use shampoo'
110. šendi	'Shandy'	šinde	'make Shandy'
111. send	'send (button)'	sined	'press the send button'
112. šipud	'skewer'	šiped	'grill (metaphor)'
113. šura	'row'	šire	'stand in a row'
114. šuv	'market'	šivek	'market'

Base		Derived Verb	
115. šem	'name'	šiyem	'give X a name'
116. spid	'Speed (game)'	spided	'play Speed'
117. tokef	validity	tikef	'make X valid'
118. tiemay	'TMI (too much information)'	timye(t)	provide too much information'
119. tanur	'oven'	tiner	'put in an oven'
120. tofu	'tofu'	tipe	'eat tofu'
121. tipeš	'stupid'	tipeš	'pretend to be stupid'
122. tapet	'wall cover'	tipet	'put wall covers'
123. tešer	'tip'	tišer	'tip'
124. tišu	'kleenex'	tišeš	'provide kleenex'
125. tost	'toast'	tistest	'make a toast'
126. titul	'diaper'	titel	'put on a diaper'
127. tavla	'chart'	tivle	'creat a chart'
128. txina	'Tahini'	tixen	'add Tahini'
129. taxman	'manipulator'	tixmen	'be manipulative'
130. tik	'file'	tiyek	'put in a file'
131. tiv	'quality'	tiyev	'improve the quality'
132. tizer	'teaser'	tizer	'tease'
133. tof	'from'	tofef	'tofef'
134. transfer	'transfer'	trinsfer	'transfer'
135. xacil	'eggplant'	xicel	'add eggplants'
136. xedek	'trunk (elephant)'	xidek	'create a shape of a trunk'
137. xefec	'item'	xifcen	'turn into a useless item'

Base		Derived Verb	
138. xagav	'grasshopper'	xigev	'hold a grasshopper'
139. xamucim	'pickles'	ximcec	'add pickles'
140. xumus	'humus'	ximes	'add hummus'
141. xarif	'hot (sauce)'	xiref	'add hot sauce'
142. xašiš	'Hashish'	xišeš	'smoke Hashish'
143. xitul	'diaper'	xitel	'use a diaper'
144. xatuv	'well-built (person)'	xitev	'make X well-built'
145. xayal	'soldier'	xiyel	'turn into a soldier'
146. xut	'wire'	'xivet'	'wire'
147. xok	'law, rule'	xokek	'make rules'
148. yediduti	'friendly'	yided	'make X friendly'
149. meyutar	'redundant'	yiter	'make X redundant'
150. yatuš	'mosquito'	yiteš	'bring mosquitoes'
151. twiter	'twitter'	tiyet	'use twitter'
152. hazaa	'sweat'	yizea	'make sweat'
153. yomemut	'commuting'	yomem / yimem	'commute'

2. hiCCiC

Base		Derived Verb	
1. blondini	'blond'	hivlind	'become blond'
2. bsisi	'basic'	hivsis	'make X basic'
3. flæš	'flash'	hifliš	'use flash'
4. flaš	'flush'	hifliš	'flush down the toilet'

Base		Derived Verb	
5. flik	'a spank'	hiflik	'spank'
6. flor	'fluoride'	hiflir	'use fluoride'
7. kahal	'crowd'	hikhil	'make crowded'
8. kalil	'light'	hiklil	'lighten up'
9. kaluš	'slight'	hikliš	'make slight'
10. katom	'orange'	hiktim	'paint orange'
11. keres	'belly'	hikris	'grow a belly'
12. klik	'click'	hiklik	'click'
13. kræš	'crash'	hikriš	'crash an application'
14. maxaze	'play'	himzix	'make into a play'
15. musag	'idea'	himsig	'make something concrete'
16. nasix	'prince'	hinsix	'turn X into a prince'
17. nozli	'liquid'	hinzil	'make liquid'
18. pliz	'pleas'	hifliz	'say please'
19. rešet	'mesh'	hiršit	'score a goal'
20. sagol	'purple'	hisgil	'paint/become purple'
21. seret	'movie'	hisrit	'make a movie'
22. škifut	'transparency'	hiškif	'create transparency'
23. skIni	'skinny'	hiskin	'make skinny'
24. šlif	'reday to be pulled out'	hišlif	'make ready to be pulled out'
25. slik	'hiding place'	hislik	'hide'
26. šluk	'sip'	hišlik	'take a sip'
27. šnac	'a noon nap'	hišnic	'take a noon nap'

Base		Derived Verb	
28. snif	'a sniff'	hisnif	'sniff'
29. snob	'snob'	hisnib	'make X snobbish'
30. spam	'spam'	hispim	'send a spam'
31. špic	'sharp edge'	hišpic	'make sharp'
32. spix	'semen'	hišpix	'ejaculate'
33. špric	'a squirt'	hišpric	'squirt'
34. friz	'freeze'	hifriz	'freeze'
35. šriri	'muscular'	hišrir	'make X muscular'
36. stres	'stress'	histris	'cause stress'
37. švic	'a brag'	hišvic	'brag'
38. switč	'switch'	hiswič	'switch'
39. varod	'pink'	hivrid	'become pink'
40. xarig	'exceptional'	hixrig	'make exceptional'
41. xlor	'chlorine'	hixlir	'use chlorine'

3. hitCaCeC

Base		Derived Verb	
a. Decausatives			
1. came	'thirsty'	hictame	'become thirsty'
2. canum	'very thin'	hictanem	'become very thin'
3. carud	'hoarse'	hictared	'become hoarse'
4. jirafa	'giraffe'	hijdaref	'become tall like a giraffe'
5. jifa	'dirt'	hijdayef	'become extremely dirty'
6. kanadi	'Canadian'	hikaned	'become Canadian'
7. smartut	'submissive person (lit. rag)'	hismartet	'become wimpy'
8. sikul	'metathesis'	histakel	'undergo metathesis'
9. šikšuk	'shake'	hištakšek	'become shaky'
10. snob	'snobbish'	histaneb	'become snobbish'
11. senili	'senile'	histanel	'become senile'
12. šipua	'slope'	hištapea	'become incline'
13. sardin	'sardine (fish)'	histarden	'become crowded like sardine'
14. šavac	'stroke'	hištavec	'suffer a stroke'
15. obsesya	'obsession'	hita?abses	'become obsessed'
16. afisat-koxot	'exhaustion'	hit?afes	'become powerless'
17. ani	'poor'	hit?ana	'become poor'
18. apaš	'extremely tired'	hit?apeš	'become exhausted, indifferent'
19. ašan	'smoke'	hit?ašen	'become full of smoke'
20. iyur	'urbanization'	hit?ayer	'undergo urbanization'
21. behema	'beast'	hitbahem	'become rude'

Base		Derived Verb	
22. biryon	'bully'	hitbaryen	'become a bully'
23. boc	'mud'	hitbocec	'get dirty by mud'
24. frexa	'bimbo'	hitfarex	'become a bimbo'
25. feyd	'fade'	hitfayed	'fade'
26. guš	'chunk'	hitgošeš	'become a chunk'
27. kiconi	'exterenist'	hitkacen	'become extremist'
28. helem	'shock'	hithalem	'become shocked'
29. kecer	'short circuit'	hitkacer	'have short circuit'
30. kalil	'easy'	hitkalel	'lighten up, become easy'
31. kunefa	'ugly and unattractive woman'	hitkanef	'become ugly'
32. keres	'belly'	hitkares	'become fat, have a big bally'
33. ketem	'stain'	hitkatem	'become full of stains'
34. kašiš	'elderly person'	hitkošeš	'become old'
35. laflaf	'wimpy'	hitlaflef	'become wimpy'
36. lulav	'ceremonial palm frond'	hitlavlev	become shaky (like a Lulav)'
37. memuca	'average'	hitmacea	become like the average'
38. mugla	'pus'	hitmagel	'get filled by pus'
39. mastul	'high (drugs)'	hitmastel	'get high/stoned'
40. matun	'moderate'	hitmaten	'become moderate'
41. muxan	'ready'	hitmaxen	'become ready'
42. namer	'tiger'	hitnamer	'become like a tiger'
43. nazelet	'a runny nose'	hitnazel	'have a runny nose'
44. parva	'fur'	hitparve	'become full of fur'

Base		Derived Verb	
45. pas	'stripe'	hitpaspes	'become full of stripes'
46. paxdan	'coward'	hitpaxden	'become frightened'
47. plonter	'knot'	hitplanter	'get complicated'
48. ra?ev	'hungry'	hitra?ev	'become hungry'
49. raze	'thin'	hitrazrez	'become thin'
50. xacuf	'audacious'	hitxacef	'become audacious'
51. xnana	'nurd'	hitxanen	'turn into a nurd'
52. yabelet	'wart'	hityabel	'become full of warts'
53. yeled	'child'	hityaled	'become childish'
54. ogen	'anchor'	mit?agen	'become anchored, stable'
55. anan	'cloud'	hit?anen	'become cloudy'
56. gešem	'rainy'	yitgašem	'become rainy'
57. puxlac	'stuffed animal'	hitpaxlec	'become extremely shocked'
58. parix	'crispy'	hitparex	'become crispy'
59. pañcer	'puncture'	hitpañcer	'become screwed up'
60. kəmpaɪl	'compile'	hitkampil	'become compiled'
61. kənfıgıyərəşən	'configuration'	hitkanfeg	'undergo configuration'
62. xaşmal	'electricity'	hitxaşmel	'get electrified'
63. ba?sa	'setback'	hitba?es	'become depressed'
64. pırxax	'a hoodlum'	hitparxex	'become a hoodlum'
b. Reflexives			
1. sinjer	'impose an unpleasant task'	histanjer	'take on an unpleasant task'
2. şampo	'shampoo'	hiştampe	'took a shower using şampo'

Base		Derived Verb		
3.	ambatya	'bath'	hitʔambet	'take a bath'
4.	šixva	'layer'	hištaxvev	'put on many layers'
5.	iglu	'igloo'	hitʔagle	'put oneself into an igloo'
6.	bacal	'onion'	hitbacel	'put on many layers like an onion'
7.	bunker	'bunker'	hitbanker	'put oneself into a bunker'
8.	hivriš	'brush'	hitbareš	brush oneself
9.	fokus	'focus'	hitfakes	'be in focus'
10.	galxac	'shaving and polishing'	hitgalxec	'shave and polish one's shoes'
11.	garʔin	'nucleus'	hitgarʔen	'arm oneself with nuclear weapon'
12.	kipod	'hedgehog'	hitkaped	'close oneself up (like a hedgehog)'
13.	korban	'sacrifice'	hitkarben	'turn oneself into a sacrifice'
14.	meʔil	'coat'	hitmaʔel	'put on a coat'
15.	magen	'shield'	hitmagen	'protect oneself'
16.	maskara	'mascara'	hitmasker	'put mascara'
17.	pica	'compensate'	hitpaca	'compensate oneself'
18.	pijama	'pajamas'	hitpajem	'put on pajamas'
19.	poza	'pose'	hitpozez	'present oneself arrogantly'
20.	xagigi	'festive'	hitxageg	'dress up'
21.	xagora	'seat belt'	hitxager	'put on a seat belt'
22.	xatix	'handsome'	hitxatex	'dress up'
23.	yafyuf	'gorgeous'	hityafyef	'adorn oneself'
c. Reciprocals				
1.	cirfet	'give a French kiss'	hictarfet	'kiss each other a French kiss'

Base		Derived Verb		
2.	esemes	'text message'	histames	'send one another text messages'
3.	dibeyt	'debate'	hidabet	'argue in a debate'
4.	arnav	'rabbit'	hit?arnev	'have sex like rabbits'
5.	mekax	'purchase'	hitmakeax	'bargain'
6.	mišpat	'trial, sentence'	hitmašpet	'argue as two lawyers'
7.	meyl	'mail'	hitmayel	'get in touch by email'
8.	navax	'bark'	hitnabeax	'bark at one another'
9.	faks	'fax'	hitfakses	'send faxes to one another'
10.	pulmus	'debate'	hitpalmes	'argue with'
11.	vikuax	'argument'	hitvakeax	'argue with'
12.	yadid	'friend'	hityaded	'become friendly with'
d. Others				
1.	cabim	'turtles'	hictabe	'lie in the sun like turtles'
2.	aclan	'lazy'	hit?acel	'be lazy'
3.	aluka	'leech'	hit?alek	'act like a leech'
4.	axzar	'cruel'	hit?axzer	'act cruelly'
5.	kivsa	'sheep'	hitkaves	'obey like sheep'
6.	masken	'miserable, poor'	hitmasken	'pretend to be miserable'
7.	masken	'poor'	hitmasken	'pretend to be poor'
8.	navi	'prophet'	hitnabe	'prophesify'
9.	nexmad	'nice'	hitnaxmed	'pretend to be nice'
10.	parcuf	'face'	hitparzef	'make faces'
11.	piyut	'liturgical poem'	hitpayet	'make up poets'

Base		Derived Verb	
12. romanti	'romantic'	hitrament	'be romantic'
13. xole	'sick'	hitxala	'pretend to be sick'
14. xantariš	'worthless person'	hitxantreš	'act foolishly'
15. xatul	'cat'	hitxatel	'act like a cat'
16. xazir	'pig'	hitxazer	'eat like a pig'
17. ahbal	'stupid'	hitahbel	'pretend to be stupid'
18. hamum	'astonished'	hithamem	'pretend to be astonished'
19. šokolad	'chocolate'	hištakled	'eat chocolate'
20. yarkon	'Yarkon (river)'	hityarken	'take a walk near the Yarkon'
21. xeyfa	'Haifa'	hitxayfen	'go to Haifa'
22. piknik	'picnic'	hitpaknek	'have a picnic'
23. parvar	'suburb'	hitparver	'move to the suburbs'
24. lap	'lap'	hitlapep	'sit on someone's lap'
25. exut	'quality'	hit?axet	'spend quality time'
26. gan	'kindergarden'	hitganen	'work in a kindergarden'
27. kinoa	'quinoa'	hitkane	'eat quinoa'

Appendix II: Verb Innovation in Palestinian Arabic

The appendix includes the examples of verb innovation I have collected. *CaCaC* verbs are divided into stem with 3 consonants and stems with more than three consonants.

tCaCCaC verbs are classified according to their thematic-semantic type.

When the base is in another language it is transcribed as it is pronounced in this language, unless it was borrowed into MH. In such cases it is transcribed as pronounced by MH speakers

1. CaCCaC

Base		Derived Verb	
a. 3 stem consonants			
1. ahl	‘family’	ahhal	‘welcome, say ahlan’
2. umma	‘nation’	ammam	‘nationalise’
3. iks	‘X’	akkas	‘put an X on somebody’
4. as ^ʕ :ir	‘juice’	ʕas ^ʕ s ^ʕ ar	‘squeeze (fruit)’
5. ʕaša	‘super’	ʕašša	‘give someone supper’
6. ʕa:lam	‘world’	ʕawlam	‘globalize’
7. ʕi:d	‘holiday’	ʕayyad	‘celebrate a (religious) holiday’
8. bha:r	‘spice’	bahhar	‘season, spice’
9. breyk	‘brake’	barrak	‘apply brakes’
10. basi:t ^ʕ	‘simple’	bassat ^ʕ	‘simplify’
11. bo:l	‘urine’	bawwal	‘urinate’
12. dahab	‘gold’	dahhab	‘gild’
13. d ^ʕ ef	‘guest’	d ^ʕ ayyaf	‘receive hospitably’
14. hidpis	‘print’	dabbas	‘print’
15. fiks	‘fix’	fakkas	‘fix’

Base		Derived Verb	
16. faks	'fax'	fakkas/faksas	'send a fax'
17. ful	'full'	fallal/fawwal	'fill up (patrol)'
18. finiš	'finish'	fannaš	'end an employee's contract'
19. fri:z	'freeze'	farraz	'freeze (trans.)'
20. ft ^ʕ ur	'breakfast'	fat ^ʕ t ^ʕ ar	'give breakfast to'
21. feʔ	'fe' (gesture)'	faʔfaʔ	'say 'fe', fe' all the time (speech defect)'
22. hawa	'air'	hawwa	'air out, ventilate'
23. yahu:di	'Jewish'	hawwad	'Judaize'
24. hit	'heat'	hayyat	'heat'
25. jild	'leather'	jallad	'bind (originally cover with leather)'
26. jisr	'bridge'	jassar	'bridge'
27. kɔpi	'copy'	kabyar	'copy'
28. kli:n	'clean'	kallan/kalnit	'clean'
29. kolon	'cologne'	kalyan	'use cologne eater'
30. krem	'cream'	karram	'use cream'
31. keš	'cash'	kayyaš	'cash a check'
32. kuħl	'eye ointment'	kaħħal	'put eye ointment on the eyes'
33. lo:n	'color'	lawwan	'color'
34. lifa	'sponge gourd'	layyaf	'scrub'
35. milħ	'salt'	mallaħ	'add salt'
36. markaz	'center'	markaz	'centralize'
37. mɪs	'miss'	masmas	'make a missed call'
38. masa:	'evening'	massa	'say good evening'

Base		Derived Verb	
39. mɛstj	‘message’	massaj	‘send a text message’
40. muxx	‘brain’	maxxax	‘brainwash’
41. numra	‘number’	nammar	‘number’
42. pork	‘park’	parrak/barrak	‘park’
43. qalam	‘pen’	qallam	‘mark’
44. qma:tʃ	‘diapers’	qammatʃ	‘change, diaper’
45. qa:nu:n	‘law’	qannan	‘limit, restrict’
46. qza:z	‘glass’	qazzaz	‘install glass’
47. raqam	‘number’	raqqam	‘number’
48. r•v•ž•n	‘revision’	ravvaz	‘review’
49. šiber	‘handspan’	šabbar	‘measure in handspans’
50. sʻaba:h	‘morning’	sʻabbaḥ	‘bless with good morning’
51. esemes	‘text message (sms)’	sammas	‘send an text message’
52. sinn	‘tooth’	sannan	‘cut one’s teeth’
53. čarj	‘charge’	šarraǰ	‘charge’
54. su:q	‘market’	sawwaq	‘market’
55. sʻot	‘voice’	sʻawwat	‘vote’
56. sʻef	‘summer’	sʻayyaf	‘spend the summer/ wear summer clothes’
57. sya:j	‘fence’	sayyaj	‘fence’
58. ček	‘check’	šayyak	‘check (in a checkbox)’
59. sayn	‘sign’	sayyan	‘sign’
60. seyv	‘save’	sayyaf	‘save a file’
61. tæp	‘tap’	tʻabtʻab	‘tap’

Base		Derived Verb	
62. tawa:bel	'spices'	tabbal	'season, spice'
63. tabu	'land registry office'	tawwab	'register'
64. ta:j	'crown'	tawwaj	'crown'
65. t ^ʰ o:q	'collar'	t ^ʰ awwaq	'surround, encircle'
66. wašem	'tattoo'	waššam	'tattoo'
67. mxallal	'pickle'	xallal	'pickle'
68. zift	'tar'	zaffat	'tar'
69. zirr	'button'	zarrar	'button'
70. ze:t	'oil'	zayyat	'oil'
71. ħadd	'limit'	ħaddad	'set, limit'
72. ħaši:š	'hashish'	ħaššaš	'smoke hashish'
b. 4 or more stem consonants			
1. barna:mij	'program'	barmaj	'plan, program'
2. dublaj	'dubbing'	dablaj	'dub'
3. dipres	'depress'	dabras	'make X depresses'
4. durbakke	'darabukka'	darbak	'play the darabukka'
5. fɔrmyələ	'formula'	farmal	'formulize'
6. fɔrmæt	'format'	farmat	'format'
7. hɪstɛrɪə	'hysteria'	hastar	'become hysterical'
8. jumruk	'customs'	jamrak	'clear through customs'
9. jʌŋgəl	'jungle'	jangal	'juggle'
10. jɛtlæg	'jet lag'	jatlag	'suffer a jet lag'
11. kahraba	'electricity'	kahrab	'electrify'

Base		Derived Verb	
12. kala:beš	‘handcuffs’	kalbaš	‘handcuff’
13. kənsel	‘cancel’	kansal	‘cancel’
14. kuskus	‘couscous’	kaskas	‘eat/make couscous’
15. makyaj	‘make up’	makyaj	‘put make up on X’
16. mizʔari	small, minimized’	mazʔar	‘minimize (a window)’
17. nɜrvəs	‘nervous’	narvaz	‘make nervous’
18. šifšef	‘rub’	šafšaf	‘rub’
19. senter	‘center’	santar	‘centralize’
20. servis	‘service’	sarvas	‘provide service’
21. tɛləfoʊn	‘telephone’	talfan	‘telephone’

2. tCaCCaC

Base		Derived Verb	
a. Decausatives			
1. amrika	‘America’	tʔamrak	‘become Americanized’
2. azme	‘crisis’	tʔazzam	‘reach a crisis’
3. ʔirq	‘root’	tʔarwaq	‘become rooted’
4. hawa	‘air’	thawwa	‘get aired out’
5. kahrabe	‘electricity’	tkahrab	‘get electrocuted’
6. markaz	‘center’	tmarkaz	‘become centralized’
7. nɜrvəs	‘nervous’	tnarvas	‘become nervous’
8. armala	‘widow’	trammal	‘be widowed’
9. waħel	‘mud’	twahħal	‘get muddy’

Base		Derived Verb	
b. Reflexives			
1. mazgan	‘air-conditioning’	tmazgan	‘cool oneself under the air-conditioning’
2. badle	‘suit’	tbaddal	‘put on a suit’
3. duš	‘shower’	(t)dawwaš	‘take shower’
4. juzda:n	‘wallet/purse’	tjazdan	‘use a wallet/purse’
5. kəžuəl	‘casual’	tkažwal	‘put on casual cloths’
6. kundara	‘shoe’	tkandar	‘put on shoes’
7. ktef	‘shoulder’	tkattaf	‘fold one's arm’
8. mikyaj	‘make up’	tmakyaj	‘put on make up’
9. hištaxlel	‘become upgraded’	tšaxlal	‘upgrade oneself’
10. ħija:b	‘veil’	tħaja:b	‘put on a veil’
11. ħinna	‘henna’	tħanna	‘henna one's hair’
c. Reciprocals			
1. biznəs	‘business’	tbaznas	‘do business together’
2. faks	‘fax’	tfaksas	‘send each other faxes’
d. Others			
1. baxi:l	‘parsimonious’	tba:xal	‘behave parsimoniously’
2. fadʿl	‘gesture’	tfadʿdʿal	‘be kind to’
3. falsafe	‘philosophy’	tfalsaf	‘philosophise’
4. ahbal	‘stupid’	tha:bal	‘pretend to be stupid’
5. kasla:n	‘lazy’	tkaslan	‘be lazy’
6. ra:s	‘head’	traʔʔas	‘head, chair, be in charge’
7. ša:tʿer	‘smart’	tša:tʿar	‘be a wise guy’

Base		Derived Verb	
8. uf	'oof (a sigh)'	tʔafʔaf	'sigh, oof'
9. ʔaša	'diner'	tʔašša	'eat supper'
10. yada	'lunch'	tyadda	'have lunch'
11. ja:sus	'spy'	tjassas	'spy'
12. su:q	'market'	tsawwaq	'shop'

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