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Derivational Productivity in the Urdu Motion Verbs' Causative Alternation

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ABSTRACT

The present study explores the nature of derivational productivity with respect to the Urdu motion verbs' causative alternation. More specifically, it addresses the questions of what types of derivational operations are involved in the causative alternation, how they differ in their productivity, and what factors constrain their productivity. The study collects data from multiple sources – lexical translation, Urdu Lughat, individual and dialogical introspection and acceptability judgment task – and frames data analysis in terms of Relational Morphology (Jackendoff & Audring, 2020). The study concludes that the main derivational processes involved in the Urdu motion verbs' causative alternation include *-a* suffixing, base modification + *-a* suffixing and base modification in direct causatives, and *-va* suffixing and base modification + *-va* suffixing in indirect causatives; these derivational processes are gradient and dynamic with respect to their productivity; various sorts of constraints – phonological, morphological, syntactic and semantic – are responsible for the variable nature of the derivational productivity. These findings carry implications for the nature of linguistic knowledge: it is more likely to be constraint-based rather than rule-based, which includes both productive and nonproductive aspects of linguistic competence

Introduction

In generative tradition, the emphasis remains on the assumption that the basic property of language is that it is "a finite computational system yielding an infinity of expressions" (Berwick & Chomsky, 2016, p.2), and it is this property which enables language users to combine elements into larger units called sentences to

communicate more complex meanings. As such this understanding always attends to the productive aspect of native speakers' linguistic competence, grammar, and often disattends to the less-/nonproductive aspect, relegating it to lexicon, a ragbag of exceptions, even though the latter constitutes a large portion of linguistic competence (Jackendoff & Audring, 2020). This approach, however, does not seem to sit well with derivational morphology where processes are not equally and fully productive (Aronoff, 1976; Lieber, 2018). For instance, suffixation of *-ness* in English is highly productive, *-ity* or *-ment* are moderately productive and *-th* seems to be unproductive (Bauer, 2001). In this regard, what is at issue is accounting for variability in derivational productivity (Aronoff & Fudeman, 2011; Bauer, 2001; Haspelmath, 2002; Lieber, 2018; Plag, 1999, among others).

The present study explores the nature of derivational productivity with respect to the Urdu motion verbs' causative alternation. The causative alternation involves verbs with both transitive and intransitive uses where the transitive use of a verb V can be paraphrased as roughly 'cause to V-intransitive' (Levin, 1993; Levin & Rappaport-Hovav,1995). (1) below represents the alternation in English:

(1) English

a. The dog walked. (Anticausative)

b. Pat walked the dog. (Causative)

The causative alternation is a cross-linguistic phenomenon, yet languages show variation in its morphological realization (Haspelmath, 1993). (2) below represents the causative alternation in the Urdu motion verbs.

(2) Urdu

a. *kʊ̈ta* *pʰɪr-a* (Anticausative)
dog.M.3SG walk-PRF.M.3SG
'The dog walked.'

b. *əli=ne* *kʊ̈ta* *pʰɪr-a-ya* (Direct causative)
ali.M.3SG=ERG dog.M.3SG walk-CAUS^{d}-PRF.M.3SG
'Ali walked the dog.'

c. *bap= ne* *əli=se* *kʊ̈te=ko* (Indirect causative)
father.M.3SG=ERG ali.M.3SG=INST dog.M.3SG=ACC
pʰɪr-va-ya
walk-CAUS^{ind}-PRF.M.3SG
'The father had Ali walk the dog. (3-variant *pʰɪr* 'walk' from Urdu Lughat)

The causative alternation also involves variation within a single language in that members of a semantically coherent verb class may behave differently (see Levin, 1993; Rappaport-Hovav, 2014). A preliminary research shows that the Urdu motion verbs show divergent behavior with respect to the number of variants, that is, not all verbs have 3-variant paradigm. Such a divergent behavior raises questions such as:

Are deviant cases arbitrary exceptions to the productive pattern? Is productivity categorical or gradient? What factors are responsible for variable productivity?

Most of the previous studies on the Urdu-Hindi causatives focus mainly on the syntax of the phenomenon (see Balachandran, 1971; Bhatt & Embick, 2017; Kachru, 1966; Richa, 2008; Saksena, 1980). As far as the present researcher knows, Sharif (2020) is the only study which deals with the derivational productivity in the Urdu change-of-state verbs and argues for gradient and dynamic productivity in the derivational operations. For an explicit characterization of the phenomenon, further research needs to be conducted in different lexical semantic domains.

Theoretical framework

To frame the data analysis, this study adopts Relational Morphology (RM) (Jackendoff & Audring, 2020), a morphological component of the Parallel Architecture (Jackendoff, 1997, 2002). In RM, a stereotypical lexical item is a linkage of a piece of phonology, a piece of meaning, and a piece of (morpho)syntax, as in Figure 1.

Phonology: /kæt/ ↔ Syntax: N ↔ Semantics: [CAT]

Figure 1 A word in the Parallel Architecture (Jackendoff & Audring, 2018)

To illustrate, consider the intransitive Urdu verb *dɔṛ* 'X run', as in (3) below.

(3) Semantics: $[\text{DɔṚ (Theme:X)}]_1$
Morphosyntax: V_1
Phonology: $/\text{dɔṛ}/_1$

In (3) above, coindex 1 marks interface links between the three levels. The relations between words are not based on derivation, but are encoded as relational links. To illustrate, consider the transitive variant *dɔṛa* 'Y cause X to run', as in (4).

(4) Semantics: $[\text{CAUSE (Agent: Y, [(DɔṚ (Theme:X)}]_1)]_2$
Morphosyntax: $[_V V_1\ \text{aff}_3\ ]_2$
Phonology: $/\text{dɔṛ}_1\ \text{a}_3\ /_2$

Coindex 2 in (4) notates interface links between the three levels of *dɔṛa*; Coindex 3 notates the contribution of the suffix: an affix linked to the pronunciation */-a/*. Coindex 1 functions as an interface link that connects the three components of the base. But being the same coindex of *dɔṛ* in (4), it also marks what is called relational link between corresponding components of the two words. The presence of the relational link gives *dɔṛa* its internal morphological structure. Relational links also encode the relation between a word and the pattern it instantiates. For this purpose, MR uses declarative schema rather than the traditional procedural rule (see Jackendoff and Audring, 2020, for rule vs. schema). To express the parallelism among

all the *-a* causative variants, we can introduce a causative schema, as in (5) below.

(5) Causative schema

Semantics:	$[\text{CAUSE (Agent: Y, } [\text{(F (Theme:X)}]_x)]_y$
Morphosyntax:	$[_V V_x \text{ aff}_3]_y$
Phonology:	/…x a_3 /y

In (5), coindex 3 links the morphosyntax and phonology of the suffix, and will be shared by all the instances of the schema, and thus will mark a relational link. The variables in semantics (F), syntax (V), and phonology (…) are linked by the variable coindex x which can mark a relational link with any word with the same pattern of structure. The three levels of the schema are linked by the variable coindex y which too can mark a relational link to anything with the same pattern.

As to the variable productivity, RM solves the problems of overgeneration and undergeneration by placing both grammatical and lexical rules in the lexicon, and by stating them in the same declarative schema format as words. RM's central proposal is that the same schema can function in both the generative role and the relational role. In their relational role, schemas capture relations among lexical items, but do not generate them. But in their generative role, schemas build up novel composite expressions by unifying the schema's variables with words or other structures. To differentiate a productive schema from a nonproductive schema, an easy solution is to mark each schema for productivity (±productive). This feature can be categorical or gradient. RM marks productivity not on a schema as a whole, but rather on its variables, which allows a possibility for a schema to have one nonproductive variable and one productive variable. Thus, productivity amounts to the openness of variables, where openness is taken to mean the degree to which a variable accepts new instantiations.

Material and Methods

Research Design

The analysis of an Urdu motion verb taken as a whole case needs to cover multiple aspects of it – phonology, morphosyntax and semantics – and their interface links. Such data requirements can be satisfied through a case study design because in it, the abstractions are built on the particulars, accommodating new details emerging during the investigation (Bogdan & Biklen, 2007 Gay; Mills & Airasian, 2012; Yin, 2003).

Data: Motion Verbs

As observed by Antonopoulou (1987), if an object changes from a place p_i at time t_i to another place p_f at a later time t_f, it is a good candidate for the semantic field

of motion (e.g., *come*, *walk* and *throw*). In addition to change-of-location verbs, verbs describing a change-of-position not of the object as a whole but of parts of it may be understood as motion verbs (e.g., *bend*, *spin*, and *swing*). In Talmy (2000b), the basic motion event consists of one object (the Figure) moving or located with respect to another object (the Ground). The core semantics of motion verbs as assumed in this study is as in (6) below and a motion verb may assume lexical representation (7a) only, or (7b) only, or both of them alternatingly, as given in (7).

(6) An event participant *Y* undergoes a change in its position/location irrespective of whether the event participant *X* causing the change in *Y*'s position/location is obvious or not.

(7) a. [BECOME [Y at <*PLACE*>]]
b. [[X ACT] CAUSE [BECOME [Y at <*PLACE*>]]]

(7) above accommodates both senses of motion verbs: (a) "come to be in position/location" and (b) "cause to come to be in position/location".

Data Sources

This study, following Aronoff and Fudeman (2011), takes a no-holds-barred approach, and assumes that multi-source evidence can either validate the theory or bring counter observations, and thus open new perspectives (Grisot & Moeschler, 2014; Sharif, 2020). It includes both corpus (lexical translation and Urdu Lughat) and introspective data (experimentation and introspection) to explore the maximum space of grammatical possibility. To prepare an adequate data set, the first strategy considered economical was to translate 247 English motion verbs from Levin's (1993) inventory, by using Qaumi English Urdu Dictionary, Government of Pakistan. However, only 70 verbs out of Levin's 247-verb list could be translated into simple (one-word) predicates in Urdu, and the remaining 177 English verbs have complex predicates as their Urdu equivalents, which indicates that Urdu favors a more analytic strategy in lexicalization. Since the word- concept mapping within and across languages is not one-to-one (Wilson & Sperber, 2012), the online versions of Oxford Dictionary and Merriam-Webster Dictionary were also consulted to ensure more rigor in translation.

To increase the amount of data, the second data source considered relevant was Urdu Lughat, a 22-volume dictionary. Out of 254165 entries in the online version, 108 verbs were manually found to satisfy our criterion given above. A list of 92 motion verbs was prepared after consolidating the data from lexical translation list and Urdu Lughat. This list was then presented to 10 Urdu consultants to sort out the common from the uncommon verbs (this decision was made on the basis of observation that Urdu Lughat, being complied on historical principles, has lots of verbs which may be out of use in modern Urdu). The final list, thus, amounted to 55 verbs. Given that no dictionary, due to its temporal nature, can be the ultimate arbiter for wordhood (Lieber, 2009), it was considered important to establish the Urdu

motion verbs' synchronic transitivity status. To this end, a Likert-type judgement task was designed to elicit responses to such forms that might occur very rarely in spontaneous speech and recorded corpus (see Schütze, 1996; Shütze & Sprouse, 2013; Sprouse & Almeida, 2013). The rating scale for stimuli (1= perfect, 2=okay, 3=awkward, 4=terrible) was adopted from Culbertson and Gross (2009). For example sentences, the researcher's introspection (Börjars, 2006; Cowart, 1997; Featherston, 2007; Himmelmann, 2012; Talmy, 2000, 2007; Wasow & Arnold, 2005) was corroborated by dialogical introspection (Valsiner, 2017) by 10 consultants, both male and female of various age groups for capturing a language variation, if any (Abbi, 2001). The study engaged both linguists and non-linguists, using purposive sampling which aims at information-rich sources.

Results and Discussion

Data Analysis

This study assumes that "The generative property of language, the "infinite use of finite means," emerges from and rides on top of the system of lexical relations" Jackendoff & Audring, 2018, p.17). This basic assumption underlying lexical relations guides the data analysis stage.

Derivational operations and productivity

The Urdu motion verbs' causative alternation maximally involves three variants – anticausative, direct causative and indirect causative:

(8)	a. Anticausative (C^{anti})	*cəl*	'Y walk'
	b. Direct causative (C^{d})	*cə.l-a*	'X cause Y to walk'
	c. Indirect causative (C^{ind})	*cəl.-va*	'Z cause X to cause Y to walk'

Table 1 below identifies the synchronic status of the Urdu motion verbs.

Table 1
Synchronic status of Urdu motion verbs

#	Motion Verb	Urdu Lughat	Judgement Task
1.	ʊbʰər 'rise'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
2.	ʊtər 'descend'	3-v Caus	3-v Caus
3.	ʊʈʰ 'leave'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
4.	ʊcək 'rise'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
5.	ʊcʰəl 'jump'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
6.	ʊɽ 'fly'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
7.	bɪdək 'flee'	2-v (C^{anti} & C^{d}) Caus	2-v C^{anti}
8.	bɛh 'flow'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
9.	bʰag 'run'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
10.	pələʈ 'return'	2-v (C^{anti} & C^{d}) Caus	2-v Caus

11.	pʊhəc̃ 'arrive'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
12.	pʰɪr 'walk around'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
13.	pʰɪsəl 'slip'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
14.	pʰɛk̃ 'throw'	2-v (C^{d} & C^{ind}) Caus	2-v Caus
15.	tɛr 'swim, float'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
16.	ʈəp 'skip, cross over'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
17.	tɛhəl 'amble'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
18.	jʰəpəʈ 'run to attack'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
19.	jʰul 'swing'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
20.	cərʰ 'climb'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
21.	cəl 'walk'	3-v Caus	3-v Caus
22.	dɔɽ 'run'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
23.	sərək 'slide'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
24.	kud 'jump, plunge'	3-v Caus	1-v C^{anti}
25.	kʰɪsək 'slip away'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
26.	kʰʊl 'open'	3-v Caus	3-v Caus
27.	gɪr 'fall'	3-v Caus	3-v Caus
28.	gʊzər 'pass by'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
29.	gʰɪsəʈ 'drag'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
30.	gʰʊs 'run into'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
31.	gʰʊm 'turn/move aound	3-v Caus	2-v (C^{anti} & C^{d}) Caus
32.	ləpək 'run after'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
33.	ləɽʰək 'move unsteadily'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
34.	lɔʈ 'return'	2-v (C^{anti} & C^{d}) Caus	2-v Caus
35.	nac 'dance'	3-v Caus	3-v Caus
36.	nɪkəl 'come out'	3-v Caus	3-v Caus
37.	mʊɽ 'come back'	3-v Caus	2-v (C^{anti} & C^{d}) Caus
38.	həʈ 'move away'	3-v Caus	3-v Caus
39.	hɪl 'move away'	3-v Caus	3-v Caus
40.	ɪʈʰla 'strut'	1-v C^{anti}	1-v C^{anti}
41.	pʰʊdək 'hop'	1-v C^{anti}	2-v (C^{anti} & C^{d}) Caus
42.	pʰəlag̃ 'jump over'	1-v C^{anti}	1-v C^{anti}
43.	ja 'go'	1-v C^{anti}	1-v C^{anti}
44.	cəkra 'turn around'	1-v C^{anti}	2-v (C^{anti} & C^{d}) Caus
45.	dəndəna 'roam around'	1-v C^{anti}	1-v C^{anti}
46.	dʰəkel 'push forward'	1-v C^{d}	1-v C^{d}
47.	ɖʰəl 'slide/set down'	1-v C^{anti}	1-v C^{anti}
48.	ɖʰo 'carry away'	1-v C^{d}	1-v C^{d}
49.	rig̃ 'creep/crawl'	1-v C^{anti}	1-v C^{anti}
50.	sədʰar 'depart/leave for'	1-v C^{anti}	1-v C^{anti}
51.	la 'bring'	1-v C^{d}	1-v C^{d}
52.	ləɽkʰəɽa 'stagger'	1-v C^{anti}	2-v (C^{anti} & C^{d}) Caus
53.	ləgɽ̃a 'limp'	1-v C^{anti}	1-v C^{anti}
54.	nɪkəs 'drain'	2-v (C^{anti} & C^{d}) Caus	1-v C^{d}

55.	hak˜drive'	1-v C^{d}	1-v C^{d}

Note. C^{anti} = anticausative, C^{d} = direct causative, C^{ind} = indirect causative

The distribution of the causative alternation variants in Urdu Lughat data is as in Table 2 below.

Table 2
The Urdu motion verbs' causative alternation status in Urdu Lughat (n=55)

Alternating 40 (72.73%)		**Non-alternating 15 (27.27%)**	
2-Variant	3-Variant	Direct-causative-only	Anticausative-only
21 (52.5%)	19 (47.5%)	4 (26.66%)	11 (73.33%)

The distribution of the causative alternation variants in judgment task data is as in Table 3 below.

Table 3
The Urdu motion verbs' status in judgement task (n=55)

Alternating 41 (74.54%)		Non-alternating 14 (25.45%)	
2-Variant	3-Variant	Direct-causative-only	Anticausative-only
34 (82.92%)	7 (17.07%)	05 (35.71%)	09 (64.28%)

Table 3 above confirms the gap between the actual words that dictionaries register and the non-actualized potential, by indicating different distribution of the variants in Lughat Lughat and speaker judgment task. As evident in Table 2, for instance, ten 3-variant verbs in Urdu Lughat (*bʰag* 'run', *pʰɪr* 'walk around', *ʈəp* 'skip, cross over', *tɛhəl* 'amble', *cəɽʰ* 'climb', *sərək* 'slide', *ghɪsəʈ* 'drag', *ghʊs* 'run into', *gʰʊm* 'turn/move around/about', and *mʊɽ* 'come back') become 2-variant alternating verbs in judgment task. Despite our 67.5% threshold, these trends indicate the dynamic nature of morphological productivity.

Table 4
Derivational operations in the Urdu motion verbs from Urdu Lughat (n=59)

Concatenative	Non-concatenative	Trans-concatenative
32 (54.24%)	9 (15.25%)	18 30.51%)
1. C^{anti} + *-a* → C^{d} (15=25.86%) 2. C^{anti} + *-va* → C^{ind} (17=29.31%) 3. C^{d} + *-va* → C^{ind} (1=1.72%)	Mod of C^{anti} → C^{d} (9=15.25%)	1. Mod of C^{anti} + *-a* → C^{d} (15=25.86%) 2. Mod of C^{anti} + *-va* → C^{ind} (3=5.17%)

Note. C^{anti} = anticausative, C^{d} = direct causative, C^{ind} = indirect causative, Mod = modification

As is evident in Tables 5 and 6 below, out of 59 morphological operations attested in the Urdu Lughat data, 32 are concatenative (see Bauer, 2003). These concatenative operations follow what Bye and Svenonius (2012, pp. 429–30) term the 'concatenative ideal': proper precedence contiguity additivity; morpheme preservation; segmental autonomy, disjointness. The non-concatenative operations attested in the data include base modification (vowel shortening/lengthening), as in *mʊ̈ɾ* 'Y return' → *moɾ* 'X cause Y to return'. In several cases, both base modification and suffixation are involved together, which Sharif (2020) terms trans-concatenative, as in *tɛ.həl* 'Y amble'→ *tɛh.l-a* 'X cause Y to amble'.

Table 5
Types of direct causativization (n=39)

-a suffixing	base mod+*-a*	base mod
1. ʊʈʰ 'leave' → ʊ.ʈʰ-a	1. bɛh 'flow'→ bə.h-a	1. mʊɾ 'return' → moɾ
2. ʊɾ 'fly' → ʊ.ɾ-a	2. bʰag 'run' → bʰə.g-a	2. ʊ.bʰər 'rise'→ ʊ.bʰar
3. pʰɪr 'walk aound' → pʰɪ.r-a	3. kud 'jump' → kʊ.d-a	3. ʊ.tər'descend'→ ʊ.tar
4. tɛr 'swim' → tɛ.r-a	4. nac 'dance' → nə.ca	4. ʊ.cʰəl 'jump'→ ʊ.cʰal
5. ʈəp 'skip' → ʈə.p-a	5. ʊ.cək 'rise' → ʊc.k-a	5. kʰʊ̈l 'open'→ kʰo.l
6. jʰul 'swing'→ jʰu.l-a	6. bɪ.dək 'flee' → bɪd.k-a	6. gʊ.zər 'pass by' → gʊ.zar
7. cəɽʰ 'climb' → cə.ɽʰ-a	7. pə.ləʈ 'return' → pəl.ʈ-a	7. gʰɪ.səʈ 'drag' → gʰəsiʈ
8. cəl 'walk'→ cə.l-a	8. pʊ.həc̃ arrive' → pʊh.c̃a	8. nɪ.kəl 'come out'→ nɪ.kal
9. dɔɽ 'run'→ dɔ.ɽ-a	9. pʰɪ.səl 'slip' → pʰɪs.l-a	9. nɪkəs 'drain' → nɪ.kas
10. gɪr 'fall' → gɪ.r-a	10. tɛ.həl 'amble'→ tɛh.l-a	
11. gʰʊ̈s 'run into' → gʰʊ̈.s-a	11. jʰə.pəʈ 'run to attack'→ jʰəp.ʈ-a	
12. gʰum 'turn around' → gʰʊ̈.m-a	12. sə.rək 'slide down' → sər.k-a	
13. lɔʈ 'return'→ lɔ.ʈ-a	13. kʰɪ.sək 'slip away'→ kʰɪs.k-a	
14. həʈ 'move away'→ hə.ʈ-a	14. lə.pək 'run after'→ ləp.k-a	
15. hɪl 'move away'→ hɪ.l-a	15. lʊ̈.ɾʰək 'stagger'→ lʊ̈.ɾʰ.k-a	

Based on type frequency in Table 5 above, the direct causative operations can be arranged on a scale ranging from the most productive to the least productive:

-*a* suffixing **base modification+-*a*** **base modification**
← most productive ……least productive →

Figure 2 A scale of of productivity in the Urdu motion verbs' direct causativization

Table 6
Types of indirect causativization (n=20)

-va suffixing		base mod+*-va*	
1.	ʊ.tər 'descend' → ʊ.tər-va	1.	bʰag 'run' → bʰəg-va
2.	pʰɪr 'walk around' → pʰɪr-va	2.	kud 'jump'→ kʊd-va
3.	pʰɛk˜throw' → pʰɛk˜-va	3.	nac 'dance' → nəc-va
4.	tɛ.həl 'amble'→ tɛ.həl-va		
5.	ʈəp 'skip' → ʈəp-va		
6.	cəɽʰ 'climb' → cəɽʰ-va		
7.	cəl 'walk' → cəl-va		
8.	sə.rək 'slide down'→ sırək-va		
9.	kʰʊl 'open'→ kʰʊl-va		
10.	gır 'fall'→ gır-va		
11.	gʰɪ.səʈ 'drag' → gʰɪ.səʈ-va		
12.	gʰʊs 'run into'→ gʰʊs-va		
13.	gʰʊm 'turn around'→ gʰʊm-va		
14.	mʊɽ 'return'→ mʊɽ-va		
15.	nɪ.kəl 'come out' → nɪ.kəl-va		
16.	həʈ 'move away'→ həʈ-va		
17.	hıl 'move way'→ hıl.va		

In the light of Table 6 above, the indirect causative operations can be arranged on a scale ranging from the most productive to the least productive. However, it is hard to say what lies between these two extremes unless the amount of data is increased by further research.

-*va* suffixing **base modification + -*va***
← most productive **……**least productive →

Figure 3 A scale of productivity in the Urdu motion verbs' indirect causativization

Constraints on derivational productivity

The gradient productivity evident in Table 6 and Table 7 above indicates constraints on morphological processes (see Bauer, 2001; Haspelmath, 2002). The data analysis shows that the phonological structure – syllabic make-up here – of the base constrains morphological processes. For instance, in most disyllabic motion bases, the vowel in the second syllable is subtracted before *-a* suffixing. The morphology of the base is found involved because both suffixes *-a* and *-va* can be added only to an underived base. The syntactic constraint becomes relevant when the word class of the base (e.g., noun, verb, adjective) counts. Both *-a* and *-va* are applicable only to an intransitive root. Semantic constraints on the base of the Urdu motion verbs are also relevant; semantic compatibility between the lexical base and the causative suffixes is always a prerequisite. The indirect causativizer *-va*, for instance, may not suffix to a base that denotes an activity where human agency functions as a direct cause

involved, not as a mere enabler. (e.g., **ʊbʰər-va* 'Z cause X to cause Y to rise' from *ʊ.bʰər* 'rise'). The analysis thus reveals that morphology has interfaces with phonology, syntax and semantics, and that these interfaces are constraint-based. The constraints discussed so far, however, do not seem to be absolute. The variation in the Urdu native speakers' judgments indicates that the native speakers may violate these constraints, and extend the domain of morphological processes.

Schema-based lexicon

As evident from the above discussion, the knowledge of morphological productivity (gradient, dynamic and constraint-based) is more likely to be schema knowledge rather than rule knowledge which tends to be rigid (see Sandra, 1995). The divergent cases discussed above posit challenge to a rule-based theory in that they satisfy the requirements of the rule, but fail to form direct causatives. In order to capture variable derivational productivity, a schema-theoretic approach like RM allows for both productive and nonproductive schemas. (9a), (10a) and (11a) represent three intransitive Urdu motion verbs, and (9b), (10b) and (11b) represent their respective direct causative variants. (12) shows the schema that relates them. The coindexation represents interface links within a structure as well as relational links across variants. In $[_{V}V]$, the inner V is the base, and the outer V is the resulting complex word.

(9) a. *pʰɪr* 'walk around'
Semantics: $[P^{H}IR \text{ (theme: X)}]_1$
Morphosyntax: V_1
Phonology: /*pʰɪr*/$_1$

b. *pʰɪra*
$[CAUSE \text{ (Agent:Y, } [(P^{H}IR \text{ (theme: X)}]_1)]_2$
$[_{V}V_1 \text{ aff}_3]_2$
/*pʰɪr*$_1$ *a*$_3$/$_2$

(10) a. *gɪr* 'fall'
Semantics: $[GIR \text{ (theme: X)}]_4$
Morphosyntax: V_4
Phonology: /*gɪr*/$_4$

b. *gɪra*
$[CAUSE \text{ (Agent:Y, } [(GIR \text{ (theme: X)}]_4)]_5$
$[_{V}V_4 \text{ aff}_3]_5$
/*gɪr*$_4$ *a*$_3$/$_5$

(11) a. *həṭ* 'move away'
Semantics: $[HəṬ \text{ (theme: X)}]_6$
Morphosyntax: V_6
Phonology: /*həṭ*/$_6$

b. *həṭa.*
$[CAUSE \text{ (Agent:Y, } [(HəṬ \text{ (theme: X)}]_6)]_7$
$[_{V}V_6 \text{ aff}_3]_7$
/*həṭ*$_6$ *a*$_3$/$_7$

(12) Direct causative schema
Semantics: $[CAUSE \text{ (Agent:y, } [(F \text{ (theme: X)}]_m]]_n$
Morphosyntax: $[_{V}V_m \text{ aff}_3]_n$
Phonology: /…$_m$ *a*$_3$/$_n$

(13) below represents an indirect causative schema.

(13) Indirect causative schema
Semantics: [CAUSE (Z:Agent [(Intermediary:Y, [(F (theme: X)]$_m$)]$_n$
Morphosyntax: [$_V$V$_m$ aff$_3$]$_n$
Phonology: /…$_m$ *va*$_3$/$_n$

The causativization patterns in the Urdu motion verbs as detailed above reveal that the lexicon is not simply an unstructured list of exceptions. Rather, a lexical item, being a long term-memory association of phonological, syntactic, and semantic features, licenses an interface between the fragments of these three structures and imposes constraints on the construction of larger units (Culicover & Jackendoff, 2005; Jackendoff, 2002). The suffixes *-a* and *-va*, thus, can be treated as lexical items that serve as interface constraints, and the lexicon as a whole is to be regarded as part of the interface components. This study also confirms Jackendoff and Audring's (2020) Relational Hypothesis: "All schemas can be used relationally. A particular subset of them, the productive ones, can also be used generatively" (p.52). This leads to a view of linguistic knowledge in which grammar is grounded in the relations among lexical items.

Conclusion

The present study reveals that the derivational operations involved in the Urdu motion verbs' causative alternation come in three types: concatenative, non-concatenative and trans-concatenative. In the direct causative alternation, the main morphological patterns involved are *-a* suffixing, base modification + *-a* suffixing, and base modification (vowel lengthening). In the indirect causative alternation, the prominent pattern is *-va* suffixing of anticausative root without any modification in monosyllabic or in disyllabic bases. The study also finds that the derivational operations are not fully and equally productive and are subject to various constrains, indicating the interface nature of the lexicon. The gradient and dynamic nature of morphological productivity supports schema-based, rather than, rule-based, approach.

References

Abbi, A. (2001). *A manual of linguistic fieldwork and structures of Indian languages.* Lincom Europa.

Antonopoulou, E. (1987). *Prototype Theory and the meaning of verbs with special reference to modern Greek verbs of motion* (Doctoral dissertation). University of London, UK.

Aronoff, M. (1976). *Word formation in generative grammar*. Cambridge, MA: MIT Press.

Aronoff, M. & Fudeman, K. (2011). *What is morphology*. UK: Wiley-Blackwell.

Balachandran, L. B. (1971). *A case grammar of Hindi with special reference to causative Sentences* (Doctoral dissertation). Cornell University, Ithaca.

Bauer, L. (2001). *Morphological productivity*. Cambridge: Cambridge University Press.

Bauer, L. (2003). *Introducing linguistic morphology*. Edinburgh: Edinburgh University Press.

Bauer, L. (2019). *Rethinking Morphology*. Edinburgh: Edinburgh University Press.

Berwick, R., & Chomsky, N. (2016). *Why only us?* Cambridge, MA: MIT Press.

Bhatt, R., & Embick, D. (2017). Causative derivations in Hindi. *Indian Linguistics*, 78(1–2): 93–151.

Bogdan, R.C., & Biklen, S.K. (2007). *Qualitative research for education: An introduction to theories and methods* (5thed.). US: Pearson Education.

Börjars, K. (2006). Description and theory. In B. Aarts & A. McMahon (Eds.), *The handdbook of English linguistics* (pp.9–32). UK: Blackwell Publishing Ltd.

Butt, M. (1995). *The structure of complex predicates in Urdu*. Stanford, CA: CSLI Publications.

Bye, P., & Svenonius, P. (2012). Non-concatenative morphology as epiphenomenon. In J. Trommer (Ed.), *The morphology and phonology of exponence* (pp.429–430). Oxford: Oxford University Press.

Cowart, W. (1997). *Experimental syntax: Applying objective methods to sentence judgments*. Thousand Oaks: Sage.

Culbertson, J., & Gross, S. (2009). Are linguists better subjects? *British Society for the Philosophy of Science*, 60, 721–736.

Culicover, P.W., & Jackendoff, R. (2005). Simpler syntax. New York: Oxford

University Press.

Featherston, S. (2007). Data in generative grammar: the stick and the carrot. *Theoretical Linguistics*, 33, 269–318.

Gay, L., Mills, G., & Airasian, P. (2012). *Educational research: Competencies for analysis and Applications* (10thed.). US: Pearson Education.

Grisot, C., & Moeschler, J. (2014). How do empirical methods interact with theoretical pragmatics? The conceptual and procedural contents of the English simple past and its translation into French. In. J. Romero-Trillo (Ed), *Yearbook of corpus linguistics and pragmatics* (pp.7–33). Switzerland: Springer International Publishing.

Haspelmath, M. (1993). More on the typology of inchoative/causative verb alternations. In B.Comrie & M. Polinsky (Eds.), *Causatives and transitivity* (pp.87–120). Amsterdam: John Benjamins.

Haspelmath, M. (2002). *Understanding morphology*. London: Arnold.

Himmelmann, N. P. (2012). Linguistic data types and the interface between language documentation and description. *Language Documentation & Conservation* 6.

Jackendoff, R. (1997). *The Architecture of the language faculty*. Cambridge, MA: MIT Press.

Jackendoff, R. (2002). Foundations of language. New York: Oxford University Press.

Jackendoff, R. & Audring, J. (2018a). Relational morphology in the parallel architecture. In J. Audring & F. Masini (Eds.), *The Oxford handbook of morphological theory* (pp.391–408). UK: Oxford University Press.

Jackendoff, R. & Audring, J. (2018b). Morphology and memory: Toward an integrated theory. *Topics in Cognitive Science*, 1–27. doi: 10.1111/tops.12334

Jackendoff, R. & Audring, J. (2020). *The texture of the lexicon: Relational morphology and the parallel architecture*. Oxford: Oxford University Press.

Kachru, Y. (1966). *An Introduction to Hindi syntax.* Urbana-Champaign: University of Illinois.

Levin, B. (1993). *English verb classes and alternations: A preliminary investigation*. Chicago, IL: University of Chicago Press.

Levin, B. & Rappaport-Hovav, M. (1995). Unaccusativity: At the syntax-lexical semantics interface. Cambridge, MA: MIT Press.

Lieber, R. (2009). *Introducing morphology*. New York: Cambridge University Press.

Lieber, R. (2018). Theoretical issues in word formation. In J. Audring & F. Masini (Eds.), *The Oxford handbook of morphological theory* (pp.391–408). UK: Oxford University Press.

Mangrio, R.A. (2016). *The morphology of loanwords in Urdu*. UK: Cambridge Scholars Publishing.

Plag, I. (1999). *Morphological productivity: structural constraints in English derivation*. Berlin: Mouton de Gruyter.

Rappaport-Hovav, M. (2014). Lexical content and context: the causative alternation in English revisited. *Lingua*, 141, 8–29.

Richa. (2008). *Unaccusativity, unergativity and the causative alternation in Hindi: A minimalist analysis* (Doctoral dissertation). Jawaharlal Nehru University.

Saksena, A. (1980). The source of causative contrast. *Lingua*, 51, 125–136.

Sandra, P.M. (1995). *Schemas in problem solving*. Cambridge: Cambridge University Press.

Schütze, C.T. (1996). *The empirical base of linguistics: Grammaticality judgments and linguistic methodology*. Chicago: University of Chicago Press.

Schütze, C.T., & Sprouse, J. (2013). Judgment data. In R.J. Podesva & D. Sharma (Eds.), *Research methods in linguistics* (pp.27–50). Cambridge, UK: Cambridge University Press

Sharif, A.N. (2020). *Causative alternation licensing in Urdu. An event structure account* (Doctoral dissertation. University of Otago, New Zealand.

Sprouse, J., & Almeida, D. (2013). The empirical status of data in syntax: A reply to Gibson and Fedorenko. *Language and Cognitive Processes*, 28(3), 222–228. doi: 10.1080/01690965.2012.703782

Talmy, L. (2000). *Toward a cognitive semantics* (Vol. II). Cambridge, MA: MIT Press.

Talmy, L. (2007). Foreword. In M. Gonzalez-Marquez, I. Mittelberg, S. Coulson & N. J. Spivey (Eds.), *Methods in cognitive linguistics*. Amsterdam: John Benjamins Publishing Company.

Valsiner, J. (2017). *From methodology to methods in human psychology*. Switzerland: Springer.

Wasow, T., & Arnold, J. (2005). Intuitions in linguistic argumentation. *Lingua*, 115,

1481–1496. http://web.stanford.edu/~wasow/Lingua_data.pdf

Wilson, D. & Sperber, D. (2012). *Meaning and relevance*. Cambridge: Cambridge University Press.

Yin, R.K. (2003). *Case study research: design and methods*. California: Sage Publications, Inc