

An experimental and distributional investigation of two ‘non-culminating accomplishments’ in Mandarin

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Abstract. The result-state lexicalization behavior of Mandarin monomorphemic transitive verbs have been claimed to be homogenous, with the vast majority contributing to ‘non-culminating’ readings in accomplishment predicates. This paper presents experimental and distributional case studies of verbs expected to challenge this claim: *xiu* ‘fix’ and *sha* ‘kill’. An experiment was conducted to examine how contextual factors influence result-state interpretation, given reports of highly variable judgments for these verbs when considered a-contextually. The results suggests that while *xiu* NP ‘fix NP’ is a true non-culminating accomplishment, *sha* NP ‘kill NP’ may lexicalize a result-state culmination, contra claims in prior work. These experimental findings are supported by the distribution of the verbs in Mandarin VV compounds, which suggest that *xiu* ‘fix’ is a manner verb (thereby not lexicalizing result-state culmination), while *sha* ‘kill’ is a result verb (lexicalizing result-state culmination). This study not only highlights the benefit of considering how contextual factors influence interpretations of verbal meaning, but it could also suggest that claims of the pervasiveness of non-culminating accomplishments in Mandarin are exaggerated.

Keywords. lexical semantics; verbs; non-culminating accomplishments; resultatives; state change; pragmatics; Mandarin

1. Introduction. Cross-linguistically, accomplishment predicates typically entail result-state culmination under perfective marking (e.g., Vendler 1957). In (1), for example, the predicate *killed the fly* entails that the fly is dead after the killing event. This entailment relation is evident from the contradiction that surfaces when result-state culmination is cancelled.

(1) # I killed the fly, but the fly is not dead.

Many accomplishments in Mandarin (based on analogous constructions in other languages) are cited as exceptions to this tendency because they yield ‘non-culminating’ readings (e.g., Soh and Kuo 2005; Chief 2007; Koenig & Chief 2007; Chen 2018; Zhang 2018).¹ Thus, according to some researchers, (2) does *not* generate a contradiction because *sha* ‘kill’ does not lexicalize result-state culmination; rather, it pragmatically implies it (Zhang 2018).

(2) Mandarin (Zhang 2018:170)
 Jingke sha-le Qin-Wang, danshi Qin-Wang mei si.
 Jingke kill-PERF King Qin, but King Qin NEG dead
 ‘Jingke killed King Qin, but King Qin is not dead.’

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¹ This is true even under non-incremental theme predicates. Indeed, the properties of the objects of incremental theme predicates interact with telicity in complex ways, not only in Mandarin, but across languages (e.g., Wright 2014).

Non-culminating accomplishments are believed by some to be incredibly widespread in Mandarin, encompassing all predicates composed of monomorphemic transitive verbs (e.g., Zhang 2018). But the empirical evidence in favor of this claim is relatively weak. The support has come primarily from felicity judgments of result-state cancellation for sentences presented a-contextually (as in (1) and (2)), often gathered from small numbers of native speakers. This approach may be problematic, given that (i) judgments (for a range of predicates) are reported to be highly variable and unstable (Koenig & Chief 2007; Chen 2018; Zhang 2018), and (ii) the notion that result-state culmination is pragmatically implied necessitates a consideration of the role of context on interpretations.

Toward this end, this paper presents an experimental case study of two monomorphemic transitive verbs, *sha* ‘kill’ and *xiu* ‘fix’, to examine how contextual information influences interpretations of result-state culmination in Mandarin for a robust set of native speakers. Participants were asked to rate the likelihood of result-state culmination based on the contexts in which the verbs were embedded. I outline the predictions in §3 greater detail, but broadly put, they are as follows: if participants shift their intuitions drastically across contexts, this would suggest that the verbs pragmatically imply result-state culmination, since implicatures are contextually modulated; if, on the other hand, intuitions do not shift drastically across contexts, this would suggest that they lexicalize result-state culmination. Broadly, as I describe in §4, the results suggest that while *xiu* ‘fix’ implies culmination, as past work has suggested (Zhang 2018), *sha* ‘kill’ entails it (at least for some speakers), contra prior work (Koenig & Chief 2007; Chen 2018; Zhang 2018).

In §5, I bolster these interpretations of the experimental results through a distributional case study of *xiu* ‘fix’ and *sha* ‘kill’ in VV compounds. Assuming that verbs lexicalize either a manner or result, but not both (Rappaport Hovav & Levin 2010), I show that while *xiu* ‘fix’ tends to surface as V₁, the position where manner components often appear, *sha* ‘kill’ tends to surface as V₂, where result components often appear. If we take this patterning as evidence that *xiu* ‘fix’ is a manner verb while *sha* ‘kill’ is a result verb, then this supports the idea that *sha* ‘kill’ entails result state culmination but *xiu* ‘fix’ does not. Taken together, the experimental and distributional findings suggest that the homogeneity of monomorphemic transitive verbs’ lexicalization behavior in Mandarin may be overstated.

2. Background. The particular class of verbs believed to compose non-culminating accomplishments in Mandarin differs significantly by account (cf. Soh and Kuo 2005, Koenig & Chief 2007, Chief 2007, Thepkanjana & Uehara 2010), but most recent work has argued that it is far-reaching, broadly encompassing all monomorphemic transitive verbs (Chen 2018; Zhang 2018). Although certain result-states (i.e. *death*) are often tightly associated with monomorphemic transitive verbs (i.e. *kill*) in Mandarin, as is the case in English where these result-states might be entailed, their cancellability in Mandarin has lent to their proposed status as pragmatic implicatures (e.g., Chen 2018; Zhang 2018). The claim has been: in English, there is a set of monomorphemic transitive verbs that lexicalize result-state culmination, and there is a set of monomorphemic transitive verbs that do not lexicalize result-state culmination (but may imply it²); in Mandarin, there is only a set of monomorphemic transitive verbs that do not lexicalize (but may imply) result-state culmination.

²An example of a monomorphemic transitive verb in English that we might say implies (but does not lexicalize) a result-state is *sweep*. A sweeping event is sometimes associated with cleanliness, but this cleanliness is not entailed. For instance, the following is felicitous: The child swept the floor, but the floor is still as dirty as it was before she swept it.

Chen (2018) and Zhang (2018) have appealed to this property of Mandarin’s verbal system to account for the heavy use of resultative constructions to unambiguously lexicalize result state culmination. Resultative constructions are “...clauses in which, in addition to the main verb (V), there is an additional, secondary predicate known as the result XP, predicating some state that comes about for some participant in the event as a result of the action described by the clause” (Beavers 2012:908). An example of a resultative construction with *sha* ‘kill’ is given in (3).

- (3) # Jingke sha-si-le Qin-Wang, danshi Qin-Wang mei si.
 Jingke kill-die-PERF King Qin, but King Qin NEG dead
 ‘Jingke killed King Qin, but King Qin is not dead.’

Note the proposed contrast in felicity between (2) and (3). In (2), result-state cancellation is said to be felicitous because *sha* ‘kill’ implies result-state culmination. In (3), result-state cancellation is infelicitous because the resultative *sha-si* ‘kill-die’ entails culmination of death. While there are differing perspectives on which monomorphemic transitive verbs (if any) lexicalize result-state culmination in Mandarin, it is accepted that the class of resultatives in Mandarin broadly does lexicalize culmination.

Resultative constructions aside, the differences among authors as to which monomorphemic verbs contribute to non-culminating accomplishments and which do not has naturally led to different analyses into the semantic sources of non-culmination. I do not summarize these accounts here, since they are not immediately pertinent to our present goals. What is relevant to point out, though, is the shared assumption that non-lexicalized result states are widespread in Mandarin, even though empirical evidence in support of this claim has not always been the strongest. Broad generalizations about Mandarin’s verbal lexicon (with regards to result-state lexicalization) have been based on the intuitions of small numbers of native speakers for small numbers of verbs. For the verbs that have received explicit attention, it has been widely reported that intuitions of the felicity of result-state cancellation vary widely across speakers, with many rejecting the cancellability of result-state culmination altogether. This raises questions of which verbs can truly yield non-culminating readings, which cannot, and where the variability in judgments come from.

This paper proceeds from the perspective that broader claims about the lexicalization behavior of Mandarin verbs can’t be made without in-depth case studies of individual verbs. As noted in the introduction, I focus here on two verbs: *sha* ‘kill’ and *xiu* ‘fix’. These verbs were chosen for two reasons. First, they have been discussed widely in previous literature, and multiple accounts align in their assessment of the verbs as implying, rather than entailing, result-state culmination (Koenig and Chief 2007; Chen 2018; Zhang 2018). These accounts offer robust points of comparison for the present study. Second, while felicity judgments of result-state cancellation have been reported to be variable for many verbs, this has been especially true for *sha* ‘kill’ and *xiu* ‘fix’ (cf. Koenig and Chief 2007; Chen 2018, Zhang 2018). Indeed, these verbs in particular may challenge accounts suggesting monomorphemic transitive verbs on the whole in Mandarin do not lexicalize result-state culmination; they are thus ideal for continued investigation.

And even if judgments of these verbs’ result-state behavior were not highly variable, the particular claim that *sha* ‘kill’ and *xiu* ‘fix’ pragmatically imply ‘death’ and ‘fixed-ness’, respectively, seems premature given the nature of the diagnostic tests deployed to gather these judgments. As I noted in the introduction, past work has relied on *a-contextual* uses of the cancellation test (as in (1)-(3)) to distinguish between entailed and pragmatically implied result-state

culmination. But while it is well-established that pragmatic implicatures are modulated by context, context has not explicitly factored into research on non-culminating accomplishments.

The cancellation test used in past work tries to get at context in an implicit way, forcing speakers to imagine scenarios in which the meaning in question does not hold. The idea is: If speakers can't imagine any contexts, they're unlikely to accept meaning cancellation; if they can imagine contexts, they'll accept meaning cancellation. The diagnostic thus not only places the burden on the speaker to interpret the nature of the meaning of interest, but it leaves open the possibility that they are making judgments on unparalleled terms. That is, exactly what kinds of contextual information (or other information) are they attending to when making a judgment? Not knowing the answer to this question is potentially problematic, because we do not know precisely why participants make the judgments they make. If we want to confidently claim that result states of monomorphemic transitive verbs are pragmatically implied, the particular role of contextual information, which underlies how all pragmatic meaning is interpreted, needs to be clearly considered.

2.1. A PRAGMATIC INVESTIGATION. One way to reframe cancellation tests, but maintain their theoretical spirit, is to explicitly provide speakers with the contextual/background information about the target utterances before asking them about the acceptability of result-state cancellation. The inclusion of contextual information has the conceptual advantage of diagnosing contextual (pragmatic) meaning with contextual tests, it lifts the burden off speakers needing to imagine their own contexts, and it sidesteps the need to present speakers with a-contextual utterances (which do not exist in actual linguistic interaction). By providing speakers with contexts, as I do in the experiment described in §3, we are also able to control for the contextual information they are attending to, which should make their decision process clearer and our interpretation of the results stronger. Of course, we can never fully control for participants' unique linguistic histories and the totality of information they draw on when making linguistic judgments, but the present experimental design should nonetheless allow us to control for this variability more than the a-contextual cancellation test would.

In addition to these more conceptual points, empirical evidence from prior work suggests that the integration of contextual information may indeed offer significant insight into the nature of result-state endpoints. Wright (2014) designed an experiment that tested whether accomplishment predicates in English (e.g., *fix a radio*, *knit a blanket*, *eat a sandwich*) would be rated as complete or incomplete based on the context in which the verbs were embedded in. For each verb, there was a context that was biased towards completion, and one biased towards noncompletion. While these predicates are typically assumed to entail completion, Wright (2014) identified a cline in the degree to which non-culmination was accepted for the verbs. He takes this as evidence that there are some accomplishments ('strict accomplishments') that entail completion to an endpoint, while others ('flexible accomplishments') may only imply it. A similar study can thus be constructed for what we're interested in: Do *xiu* 'fix' and *sha* 'kill', pragmatically imply result state culmination, as past work suggests (Chen 2018; Zhang 2018), or do they lexicalize their result states? In §3, I describe the design, predictions, and results of an experiment on Mandarin that is similar in scope to Wright's (2014) to test this question. Specifically, it examines whether participants are more or less likely to accept result state culmination if contextual information biased toward or against culmination is provided.

3. The experiment. The experiment was designed to determine whether *sha* 'kill' and *xiu* 'fix' imply, rather than lexicalize, their result states. I test the extent to which background contextual

information about the agent and patient of the target verbs influences participant ratings about the likelihood of result-state non-culmination for sentences of the form in (1).

If *xiu* ‘fix’ and *sha* ‘kill’ imply the result states of ‘fixed-ness’ and ‘death’ as pragmatic implicatures, then we should expect context to influence ratings of result-state culmination, since pragmatic meaning is contextually determined. On the other hand, if *xiu* and *sha* lexicalize the result states of death and fixed-ness, we should expect context to have little effect on ratings because result verbs lexically encode result states. The experiment tests these predictions.

In addition to the monomorphemic verbs, the experiment also tests intuitions about resultative forms: *sha si* ‘kill dead’ and *xiu hao* ‘fix good’. The resultative forms were included to provide a baseline to which the monomorphemic forms could be compared. As noted in §2, resultative constructions entail their results (Zhang 2018), so the likelihood of result culmination for these forms should theoretically not be modulated by context. By comparing the result-state culmination ratings for the monomorphemic verbs with those of the resultatives, we can establish the strength of the contextual effect for the monomorphemic verbs. That is, if the effect of context on result culmination ratings is statistically greater for a monomorphemic verb than for its corresponding resultative, then this would suggest that the monomorphemic form implies, rather than entails, its result state. In contrast, if the effect of context on result culmination ratings is the same for a monomorphemic verb and its resultative, then this would suggest that the monomorphemic form entails result culmination.

3.1. PARTICIPANTS. 102 native speakers of Mandarin were recruited through Prolific Academic to participate in the experiment. Of these, 28 failed attention check questions, so their responses were ultimately excluded. This resulted in a total of 74 participants who contributed analyzable ratings. 25 of these participants were from China, 17 were from Hong Kong, 11 were from the US, 11 were from unspecified countries, and 10 were from Taiwan.

3.2. CONTEXTUAL SCENARIOS. 8 unique contextual scenarios were created for *xiu* ‘fix’, and 8 for *sha* ‘kill’, resulting in a total of 16 critical contexts. Contexts were around 100 words long. Within the 8 scenarios for each verb, 4 were constructed to be biased toward result-state culmination, and 4 were constructed to be biased against result-state culmination. These were constructed in pairs. That is, for each of the 4 scenarios biased toward result state culmination, there was one matched to it that was biased against result-state culmination. The overall content for each pair was kept constant, and what differed between scenarios in each pair was only whether the properties of the agent or instrument were biased toward or against culmination. Each scenario in a pair thus differed only minimally.

For instance, in a scenario biased toward culmination for *sha* ‘kill’, the agent might kill a deer with a gun that is described as top-of-the-notch in its accuracy. For the matching scenario biased against culmination, the agent might kill a deer with a gun that is described as poorly made and very inaccurate. In this example pair, the biasing is mediated by the instrument, but for 2 of the paired scenarios for each verb (4 scenarios in total), the biasing was encoded through the agent. Thus, for each verb, 2 pairs (4 scenarios) focused on the role of the agent in favoring/disfavoring result-state culmination, and 2 pairs (4 scenarios) focused on the role of the instrument.

An example of a pair of scenarios in which the biasing condition is mediated by the agent of the verb is given below. This pair focuses on the verb *xiu* ‘fix’. Scenario 1a is

constructed to be biased against result-state culmination because of the agent's disinterest in jewelry. Thus, this context is one of the 2 contexts (shown in Figure 1) that centers around the agent in a disfavoring condition for *xiu* 'fix'.

- (4) **Contextual scenario 1a:** *Wang Fang's parents own a family jewelry business. When Wang Fang graduated from high school, she wanted to go to college, but her parents forced her to take a full-time position at their jewelry store instead. Not only does Wang Fang hate jewelry, but she is resentful of her parents for making her work at their business. Her poor attitude has been affecting her job performance deeply, and she's been called the worst jeweler in town. Today, someone brought in a broken watch, and Wang Fang attended to it.*

Scenario 1b given below is another context for *xiu* 'fix'. In contrast to 1a, this one is biased toward result-state culmination because of the agent's interest in jewelry. Scenario 1a and scenario 1b differ only in that scenario 1a biased towards result state culmination, while scenario 1b biased against it.

- (5) **Contextual scenario 1b:** *Wang Fang's parents own a family jewelry business. When Wang Fang graduated from high school, she wanted to follow in the footsteps of her parents and take a job at their jewelry store. Wang Fang was always fascinated by the craftsmanship that went into her family jewelry. Wang Fang loves her job, and her passion for jewelry shows in her job performance. She's been called the best jeweler in town. Today, someone brought in a broken watch, and Wang Fang attended to it.*

Participants were exposed to both scenarios in a pair (within-subjects design).³

3.3. QUESTION AND TARGET SENTENCE. Sentences containing the target verbs immediately followed the contextual scenarios. These sentences took the form: NP killed/fixed NP. They varied by whether the target verb form was monomorphemic (*xiu* 'fix', *sha* 'kill'), or resultative (*xiu-hao* 'fix good', *sha-si* 'kill dead'). Each of the 16 total contextual scenarios (discussed above) thus appeared with a sentence containing either the monomorphemic verb and the resultative verb, resulting in a total of 32 total critical items.

The question that participants responded to followed the scenarios and target sentences. It was formulated as follows: *How likely is it that the NP is still alive/broken?* The NP corresponded to the patient of the verb and the result state of "alive" or "broken" depended on whether the critical verb was *xiu* 'fix' or *sha* 'kill'. The verb form condition (monomorphemic or resultative) was between-subjects, meaning participants only saw all monomorphemic or resultative forms. This design was chosen so as not to draw explicit attention to the linguistic structures of interest (i.e., the verb forms) and potentially amplify rating differences between them.

3.4. PROCEDURE. Participants were exposed to 14 experimental items, 8 of which were critical items and 6 of which were fillers and controls. They were asked to read the contextual scenarios, and based on the scenarios, rate the likelihood that the patient of the verb was still "alive" or "broken" using 9-pt Likert scales. A rating of 1 indicated that result culmination was extremely likely, and a rating of 9 indicated that result culmination was extremely unlikely. The experiment took an average of 10 minutes. An example of an experimental trial is in Figure 1.

³ A between-subjects design was not chosen for the context condition because it would have necessitated quite a large number of participants for adequate statistical power, and given the small subject pool of native Mandarin speakers who meet Prolific Academic's screening requirements, achieving such a sample would have been difficult.

王杨住在森林边，森林里住着许多鹿。他靠种植一种很值钱的黑莓糊口。可是松鼠也很喜欢这种黑莓，它们经常跑来偷吃，给王杨带来了很大损失。上个月他精挑细选买了一把特别精准的猎枪，它是可以买到的最好的枪。早上，他守在果园里杀了一只鹿。

请问：有多大可能那只鹿还活着？



Figure 1. Experimental trial

4. Results. A series of mixed-effects linear regression models were constructed in R Studio to test the effects of context, verb, and verb form on likelihood ratings. Best-fit models were assessed through chi-square likelihood tests using the *anova* function. I first report all of the main results for the sake of transparency in this section. In the following section, I highlight and discuss the findings that are particularly interest for our goals.

4.1. STATISTICAL FINDINGS. The first model examined the overall effects of the conditions on the likelihood ratings. The best-fit model included fixed-effects of verb, verb form, and the interaction of verb form and context. The agent/instrument condition and participant birthplace did not improve the model and were thus excluded. A random by-participant intercept and random by-stimulus slopes for context were also included.

First, there was a main effect of context. Regardless of verb form (monomorphemic or resultative), participants selected a higher likelihood of result-state culmination when the context was biased toward culmination (Est. = -1.2295; $p < 0.001^{***}$). This can be seen in Figure 2. Second, there was a main effect of verb form. Regardless of verb ('fix' or 'kill'), participants selected a higher likelihood of result-state culmination when the verb was a resultative than when it was monomorphemic (Est = -1.1987; $p < 0.01^{**}$). Third, regardless of verb form (monomorphemic or resultative), participants selected a higher likelihood of result-state culmination for *sha* 'kill' than for *xiu* 'fix' (Est = -2.1398; $p < 0.001^{***}$). This is shown in Figure 3.

Subsequent models tested the effects of context and verb form on *sha* 'kill' and *xiu* 'fix' individually. These models included fixed effects of context and verb form, a random by-participant intercept, and random by-stimulus slopes for context. As in the main model, context also had an effect on both verbs in their individual models. However, this effect was larger for *xiu* 'fix' (Est = -1.4545) than *sha* 'kill' (Est = -0.98485). Additionally, while verb form had an effect on *xiu* 'fix' (Est = -1.3049; $p < 0.05^*$), it did not have an effect on *sha* 'kill' (Est = 0.02205; $p = 0.96031$), suggesting that both resultative and monomorphemic forms of *sha* are interpreted as lexicalizing culmination to the same degree.

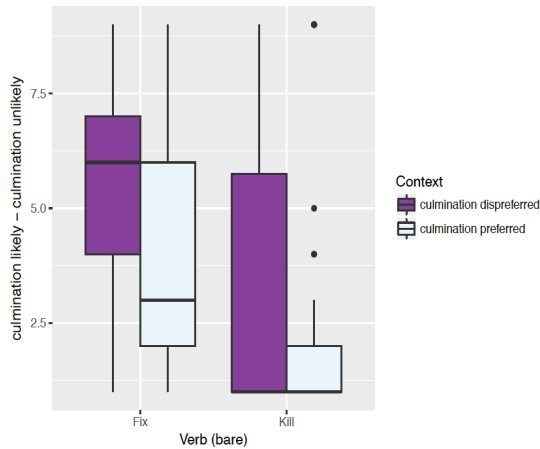


Figure 2. Effect of context on ratings.⁴

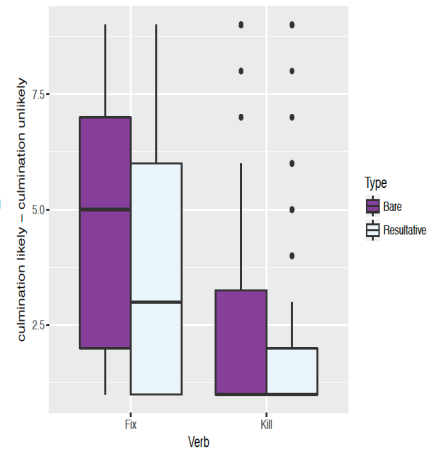


Figure 3. Effect of verb form on ratings.

4.2. DISCUSSION. The results of the experiment offer insight into the nature of the result state entailments for *xiu* ‘fix’ and *sha* ‘kill’. I begin the discussion with descriptive generalizations about median rating differences between the verbs in both context conditions. For *xiu* ‘fix’, context has a large effect on the likelihood that the result state of the monomorphemic form is taken to culminate. This is shown in Figure 2, where the median rating between context conditions differed by 3 points for *xiu* ‘fix’. Specifically, the median rating for result-state culmination was 3 points higher (i.e., culmination less likely) when the context was biased against culmination than when it was biased towards culmination. In contrast, for *sha* ‘kill’, the median rating is the same for both context conditions, at 1. This is also shown in Figure 2.

There is thus a clear difference in how context is affecting each of the verbs: *xiu* ‘fix’ is affected more than *sha* ‘kill’. Because context strongly affects the likelihood of result-state culmination for *xiu* ‘fix’, this may suggest that *xiu* ‘fix’ pragmatically implies the result state of “fixed-ness”. Recall that pragmatic implicatures are contextually variable. While culmination was interpreted as likely for *xiu* ‘fix’ when the context was biased towards culmination (Figure 2), it was interpreted as unlikely when the context was biased against culmination. On the other hand, that there was no difference in median ratings between contexts for *sha* ‘kill’ may suggest that *sha* ‘kill’ lexicalizes the result state of death, at least for some speakers (more on this later). Lexicalized meanings, as opposed to pragmatic implicatures, hold across contexts. Thus contextual shifts within the experimental paradigm should be absent (or at the very least, minimal) if the result state is lexicalized.

Further evidence in support of the claim that *sha* ‘kill’ lexicalizes its result state, while *xiu* ‘fix’ implies its result state, is that the two verbs differ not only in the degree of difference in ratings between context conditions, but also in the likelihood of result culmination overall. Participants rated death as more likely for the killing events than fixed-ness was for the fixing event. This was confirmed statistically, and we can also see this qualitatively from the median rating differences between the two verbs. The monomorphemic form of *sha* ‘kill’ had a median likelihood of rating of 1 regardless of context (i.e., “extremely unlikely that NP is still alive”), while the monomorphemic form of *xiu* ‘fix’ had a median score of 5 regardless of context. These median scores are shown in Figure 3. They ultimately show that result states are more favored for *sha* ‘kill’ than *xiu* ‘fix’.

⁴ I use “bare” in Figure 3 to mean monomorphemic.

All of this said, it needs to be noted that the preceding discussion has attended primarily to *median* likelihood ratings between the verbs (as are displayed in the boxplots) to suggest that *sha* ‘kill’ may lexicalize result-state culmination. However, linear regression modelling (results discussed in §4.1) relies on *mean* ratings. This is why, although median ratings for both contextual conditions for *sha* ‘kill’ are at floor (Figure 2), there was a statistically significant effect of context for *sha* ‘kill’ (the mean ratings between conditions differed). While many participants interpreted culmination of death as extremely likely regardless of contextual condition, others didn’t. This is clear from the wider spread of scores for *sha* ‘kill’ in the “culmination dis-preferred” condition than the “culmination preferred” condition. While this variability could suggest that *sha* ‘kill’ does not lexicalize result-state culmination for *all* speakers (but only some)⁵, it is also possible that the design of the experiment may have encouraged, or exaggerated, differences between contextual conditions. Recall that a within-subjects design was used for the context condition, meaning that participants were exposed to *both* contextual scenarios in a pair (for example, both (4) and (5)). Because of the way the pairs were constructed, the experimental goal may have been transparent, and participants may have adjusted their ratings accordingly to coincide with expectations. In any case, it does indeed appear that, for some speakers at least, *sha* ‘kill’ does indeed lexicalize culmination of death.

This claim is further bolstered by the statistical insignificance of verb form on *sha* ‘kill’ ratings. That is, regardless of whether *sha* ‘kill’ was in monomorphemic or resultative form, the statistical model identified no statistical difference in likelihood ratings. Assuming that resultative constructions in Mandarin (Zhang 2018) and in languages more generally (Rappaport Hovav & Levin 2010) lexicalize result states, this insignificant effect may suggest that the monomorphemic *sha* ‘kill’, too, lexicalizes result-state culmination. In contrast, recall that for *xiu* ‘fix’, culmination was interpreted as significantly *more* likely under the resultative (*xiu-hao*) than the monomorphemic verb (*xiu*). Taking together these points with the other experimental findings discussed in this section, it seems clear: *sha* ‘kill’ lexicalizes result-state culmination (for at least some speakers), while *xiu* ‘fix’ does not (but implies it in certain contexts).

4.3. ON THE RESULTATIVES. Although our primary interest is on the meaning of the monomorphemic verbs, in this section I take a brief aside to discuss ratings for the resultative forms.

It is notable that the resultative *xiu-hao* ‘fix-good’ shows a relatively wide spread of ratings (Figures 2 & 3). There is little question that resultatives entail result-state culmination in Mandarin, and this should unambiguously trace to ratings at the very low end of the scale (i.e., culmination extremely likely), as we see for *sha-si* ‘kill-die’. What can account for these different interpretations of culmination for the two resultatives?

One explanation may lie in the nature of the result states that were tested for each of the verbs: ‘dead’ (for *sha* ‘kill’) and ‘fixed’ (for *xiu* ‘fix’). Someone (or something) is typically described as either completely ‘dead’ or completely ‘alive’. It’s not clear that either adjective is used to refer to an intermediate state, so the two may form a two-point scalar dimension. This might explain the narrower range of ratings for *sha-si* ‘kill-die’, most of which are concentrated at one end of this scale. In contrast, the wider range of ratings for *xiu-hao* ‘fix-good’ might be attributable to ‘fixed’/‘broken’ as encompassing a multi-point, rather than two-point, scalar dimension. ‘Fixed’ can be used to refer to the state of an object that is completely restored (no broken aspects remain), or it may be used to refer to a state somewhere between completely bro-

⁵ Over half of the participants in the monomorphemic verb condition rated culmination for *sha* ‘kill’ as “extremely likely”, regardless of whether the verb was embedded in a context biased toward or against culmination.

ken and completely fixed. Some kind of manipulation might be performed on an object such that it is less ‘broken’ than it was before, but it still may not be in perfect working order. Despite not being in working order, the repair itself might be sufficient for the object to be considered fixed. This multi-point scalar dimension thus does not correspond so directly to a clearly demarcated, finite set of end points, as ‘dead’ and ‘alive’ do. These differences in scale may account for the wider variation in ratings for *xiu-hao* (‘fix-good’).

5. Support from manner/result complementarity. In this section, I appeal to the notion of manner/result complementarity and the distribution of *sha* ‘kill’ and *xiu* ‘fix’ in Mandarin VV compounds to support the claim that emerged from the experimental findings: that *sha* ‘kill’ lexicalizes result-state culmination, while *xiu* ‘fix’ implies it.

5.1. MANNER AND RESULT VERBS. Rappaport Hovav & Levin (2010) have posited a crosslinguistically stable distinction in verbal lexica between verbs that describe bringing about results and verbs that describe manners of doing. They suggest that manner and result verbs are in complementary distribution, such that a verb will only lexicalize a manner or a result – not both. Thus, while a result verb might be typically associated with a particular kind of manner, and a manner verb might be often linked with certain results, the verb only encodes one or the other. For instance, *wipe* and *scrub* are manner verbs because they denote a kind of sweeping motion. While they are often associated with achieving cleanliness, it is possible to wipe and scrub a surface and for it to be the same as it was prior to the activity. These verbs thus denote the *manner* of the activity, and not its result. The verbs *shatter* and *crack*, on the other hand, are result verbs because they describe the *result* of an event on an entity. The manner by which this breaking event is carried out is not directly specified by the verb.

5.2. MANNERS AND RESULTS IN MANDARIN. Zhang (2018) has made the observation that in Mandarin VV result compounds (i.e., compounds that encode a result), manner verb components tend to surface as V_1 , while result verb components tend to surface as V_2 .⁶ We can capitalize on this verbal property to make predictions about how *sha* ‘kill’ and *xiu* ‘fix’ should behave given our predictions about their lexicalization behaviors. Based on the experimental results, we might expect (1) *sha* ‘kill’ to be a result verb, since it lexicalizes the result of death, and (2) *xiu* ‘fix’ to be a manner verb, since it doesn’t lexicalize a result. If these predictions are accurate, *sha* ‘kill’ should surface as V_2 , followed by a manner component as V_1 , and *xiu* ‘fix’ should surface as V_1 , preceded by a result component as V_2 , assuming manner/result complementarity. Based on dictionary searches and consultations with native speakers, this is precisely what we find. Figure 4 shows examples of VV compounds containing *xiu* ‘fix’, and Figure 5 shows examples containing *sha* ‘kill’.

⁶ The VV compounds I discuss here are not all “resultatives” in the strictest sense. In Mandarin, resultative constructions encode result states with intransitive verbs.

Compound	By-verb translation	Overall translation
<i>xiu-zheng</i>	'fix-positive'	'make-correct'
<i>xiu-duan</i>	'fix-short'	'shorten'
<i>xiu-shu</i>	'fix-adorn'	'decorate/embellish'
<i>xiu-bu</i>	'fix-mend'	'mend-repair'
<i>xiu-jian</i>	'fix-cut'	'trim'
<i>xiu-xingjian</i>	'fix-build'	'build'
<i>xiu-duan</i>	'fix-finish'	'fix to completion'

Figure 4. *xiu* 'fix' VV compounds.

As we can see in Figure 4, *xiu* 'fix' often surfaces as V₁, followed by verbal components that denote result verbs or states (as V₂). Such combinations would not be expected if *xiu* 'fix' already lexicalized a result state, assuming that VV compounds combine manner and result components, and that a verb lexicalizes either a manner or result, but not both (Rappaport Hovav & Levin 2010). This would seem to suggest that *xiu* 'fix' is a manner verb.

But what kind of manner does it encode? Although I have been glossing *xiu* as 'fix', Chinese-English dictionaries translate it in a range of ways: 'decorate', 'mend', 'trim'. Its meaning is specified by the following verbal morpheme that it combines with, but what unites all of its uses appears to be very vague manner: one of physical manipulation. *Xiu* 'fix' itself does not lexicalize any change that might come about from this manipulation, as this result is denoted by the result components it combines with (e.g., *shi* 'adorn', *jian* 'cut', *xingjian* 'build', *duan* 'shorten'). In the instances in which *xiu* 'fix' is used as a monomorphemic verb, a result state (e.g., fixed-ness, adornment) might be pragmatically implied. But *xiu* 'fix' itself only lexicalizes the physical manipulation that may bring about, or be assumed to bring about, this result state.

What about *sha* 'kill'? In contrast to *xiu* 'fix', *sha* 'kill' often surfaces as V₂, preceded by manner verb components (as V₁). This is shown in Figure 5⁷. The manner components in Figure 5 describe the *manner* in which the killing event is carried out (e.g., stabbing, shooting, etc.), which means that *sha* encodes the result of the killing event (i.e., death). This suggests that *sha* 'kill' is a result verb. Indeed, and just as we should predict for result verbs (given manner/result complementarity), *sha* is ambiguous with regards to the manner in which killing takes place, according to native speakers.

Compound	By-verb translation	Overall translation
<i>ci-sha</i>	'stab-kill'	'kill by stabbing'
<i>du-sha</i>	'poison-kill'	'kill by poisoning'
<i>qiang-sha</i>	'beat-kill'	'kill by beating with a stick'
<i>zhang-sha</i>	'shoot-kill'	'kill by shooting'
<i>ji-sha</i>	'hit-kill'	'kill by hitting'
<i>e-sha</i>	'strangle-kill'	'kill by strangling'
<i>pin-sha</i>	'fight-kill'	'kill by fighting'

Figure 5. *sha* 'kill' VV compounds.

⁷ There are instances in which *sha* 'kill' appears as V₁ (e.g., *sha-hai* 'murder', *sha-lu* 'massacre'), but according to native speakers, these are infrequent.

To sum up: the distribution of *sha* ‘kill’ and *xiu* ‘fix’ in VV compounds suggests that the former is a result verb, and the latter is a manner verb. This classification supports the findings from the experiment: *sha* ‘kill’ lexicalizes result-state culmination, while *xiu* ‘fix’ does not.

6. Conclusion. This paper offered an experimental pragmatic investigation to determine whether result state culmination is implied or lexicalized for the Mandarin verbs *xiu* ‘fix’ and *sha* ‘kill’. The results suggested that while *xiu* ‘fix’ implies the result state of fixed-ness, *sha* ‘kill’ lexicalizes the result state of death (at least for some speakers), contra prior claims in the literature (Koenig and Chief 2007; Chen 2018; Zhang 2018). This interpretation of the experimental results was supported by the patterning of the verbs in VV compounds, which suggested that *sha* ‘kill’ is a result verb, while *xiu* is a manner verb.

Methodologically, this paper demonstrates the advantage of integrating contextual information into diagnostics testing verb meaning. Theoretically, the results may suggest that Mandarin monomorphemic transitive verbs are not as homogenous in their result-state lexicalization behavior as sometimes claimed, and, thus, non-culminating accomplishments may not be as widespread in Mandarin as sometimes assumed.

References

- Beavers, John. 2012. Resultative constructions. In Robert Binnick (ed.), *The Oxford handbook of tense and aspect*, 908–933. Oxford: Oxford University Press.
<https://doi.org/10.1093/oxfordhb/9780195381979.013.0032>.
- Chen, Jidong. 2018. ‘He killed the chicken, but it didn’t die’: An empirical study of the lexicalization of state change in Mandarin monomorphemic verbs. *Journal of Chinese Language and Discourse* 9(2). 136–161. <https://doi.org/10.1075/cld.17007.chen>.
- Koenig, Jean-Pierre & Liancheng Chief. 2007. Scalarity and state-changes in Mandarin. In Olivier Bonami & Patricia Hofherr (eds.), *Empirical issues in syntax and semantics* 7. 241–262. Paris: Colloque de Syntaxe et Sémantique à Paris.
- Liancheng, Chief. 2007. *Scalarity and incomplete event descriptions in Mandarin Chinese*. Buffalo: NY: University of Buffalo dissertation.
- Rappaport Hovav, Malka & Beth Levin. 2010. Reflections on manner/result complementarity. In Malka Rappaport Hovav, Edit Doron & Ivy Sichel (eds.), *Syntax, lexical semantics, and event structure*, 21–38. Oxford: Oxford University Press.
<https://doi.org/10.1093/acprof:oso/9780199544325.003.0002>.
- Soh, Hooi Ling & Jenny Yi-Chun Kuo. 2005. Perfective aspect and accomplishment situations in Mandarin Chinese. In Henk J. Verkuyl, Henriette De Swart & Angeliek Van Hout (eds.), *Perspectives on Aspect*, 199–216. Dordrecht: Springer.
- Thepkanjana, Kingkarn & Satoshi Uehara. Syntactic and semantic discrepancies among the verbs for ‘kill’ in English, Chinese, and Thai. *Proceedings of PACLIC* 24. 291–300.
- Vendler, Zeno. 1957. Verbs and times. *The Philosophical Review* 66(2). 143–160.
<https://doi.org/10.2307/2182371>.
- Wright, Tony. 2014. *Strict vs. Flexible Accomplishment Predicates*. Austin, TX: University of Texas Dissertation.
- Zhang, Anqi. 2018. *On Non-Culminating Accomplishments in Mandarin*. Chicago, IL: University of Chicago Dissertation. <https://doi.org/10.1515/ling-2020-0184>.