Construing Temporal Magnitudes: Implications for Event Conceptualisation

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Abstract

The paper investigates the effect of alternating construals of temporal magnitudes on individuals’ reasoning about events that are explicitly embedded in time. Specifically, I analyse the meaning-making potential of “cumulative” and “fractional” construals, as in “30 minutes” and “half an hour”. Inspired by Cognitive Linguistics postulates, the hypothesis is that although these alternate constructions of time quantities are numerically equivalent, i.e. the objective time intervals designated are the same, they will differently prompt conceptualisation and reasoning about events they structure. This hypothesis is empirically tested with native and non-native speakers of English at four levels of time granularity, for seconds/minute, minutes/hour, weeks/month and months/year configurations.

The findings show that there is a consistent major effect indicating a semantic-conceptual asymmetry between cumulative and fractional construals for the seconds/minute level, and a weaker, though analogous, effect for the months/year level, with the fractional construals ‘magnifying’ the quantity. Critically, the effect is found to hold in the case of conceptualisers for whom English, in which stimuli were presented, was their L2 while English native speakers appear to be ‘immune’.

I discuss the potential motivation behind those patterns as well as the effect’s theoretical and practical implications. Finally, the findings are then related to a study on individuals’ intuitive predictions about meaning-making implications of alternating between cumulative and fractional construals of time.

Keywords
alternate construals – conceptualisation – meaning construction – temporal expressions – events
1 Introduction

The paper addresses the proposal that language form is interrelated with meaning (e.g. Langacker, 1987, cf. Evans and Green, 2006; Geeraerts and Cuyckens, 2007). In that proposal expressions are taken to function as representations of construals and as partial instructions that initiate complex processes of meaning construction. As such, the expressions the speaker chooses between can never be fully synonymous, i.e. identity of meaning cannot be viably postulated (cf. Bergen and Wheeler, 2010; Matlock, 2004).

In a series of studies, the paper brings together examinations of quantification, on the one hand, and time, on the other, to test the hypothesis empirically. I look into alternate construals of time that are termed “cumulative” and “fractional” (Deckert and Pęzik, 2014; Deckert, 2016) to see if their linguistic realisations prompt different meanings, despite the fact that the designated durations are identical. The analysis focuses on different levels of granularity in time quantifying construals: from seconds to months.

2 Alternating Construals

A linguistic expression is a tangible result of organising conceptual content (cf. Langacker, 1987, 2008). In line with the Cognitive Linguistics paradigm, the differences between expressions – even highly synonymous ones – bring about significant differences in the process of meaning construction which gets triggered by language stimuli. Therefore, while the concepts activated by (1) and (2) below might be highly analogous, the meaning of those expressions – i.e. conceptualisations that they initiate – will be non-identical by virtue of the construal imposed on the content

(1) Rome is visited by many people.
(2) Many people visit Rome.

In the example above, the difference is visibly in prominence – one of the parameters of construal outlined by Langacker (2008) – as the construals represented linguistically by (1) and (2) differently guide us to allocate attention to elements of the scene. Outside of the realm of linguistics, prominence reconfigurations are instantiated in what has been investigated under the heading of “framing”, i.e. how the selection of frames influences people’s judgement. A now standard example was given by Tversky and Kahneman (1981: 453) where the choice of either positive or negative frame appears to be highly consequential for individuals’ decision-making.
Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:

If Program A is adopted, 200 people will be saved. If Program B is adopted, there is $\frac{1}{3}$ probability that 600 people will be saved, and $\frac{2}{3}$ probability that no people will be saved. Which of the two programs would you favor?

If Program C is adopted 400 people will die. If Program D is adopted there is $\frac{1}{3}$ probability that nobody will die, and $\frac{2}{3}$ probability that 600 people will die. Which of the two programs would you favor?

A real-life example of how the structuring of a message conditions decision-making is given by Johnson and Goldstein (2004). They point out there is very considerable cross-country variation in organ donation consent rates, with two categories of countries emerging. On the one hand there are countries with low consent rates such as in Denmark (4.25%), the Netherlands (27.5%), the United Kingdom (17.17%) and Germany (12%), and on the other hand there are countries where the rates are consistently much higher – Austria (99.8%), Belgium (98%), France (99.91%), Hungary (99.997%), Poland (99.5%), Portugal (99.64%) and Sweden (85.9%). Strikingly, the explanatory variable here is the phrasing of the question about one’s consent to donate organs. The first group of countries use an “opt-in” type of question where the respondent has to actively choose to join the organ donation programme, while the second group of countries use an “opt-out” type of question where the respondent has to actively decide not to join the programme. That is to say, in this context not making a choice actively is tantamount to nonetheless making it, if in a passive default-defined manner determined by somebody else’s decision realised linguistically.

Another domain where construal plays a crucial role is that of memory. Loftus and Palmer (1974) and Loftus (1975) demonstrated that language can be employed to implant memories into individuals’ minds with the use of differently worded leading questions. In one experiment subjects watched a car crash video and were then instructed to answer questions about the footage such as (3) with “smashed” being one of the variants used in parallel with “collided”, “bumped”, “contacted” and “hit”:

(3) About how fast were the cars going when they smashed into each other?

It is important to highlight that the subjects were presented with the questions and gave their answers directly after watching the video but the “objective”
audiovisual stimuli were insufficient to defeat the effect of implantation achieved through the choice of construal, and speed estimates were affected by the verb used. What is more, a week after the screening of accidents subjects were asked to state if they remembered any broken glass on the scene. Again, while there was no glass in the video they watched a week earlier, subjects for whom the event was linguistically construed as more violent were more likely to give a positive answer.

In turn, Loftus (1974) as well as Loftus and Zanni (1975) showed how the choice of article in a question influences people’s answers. Their subjects watched a car accident involving a number of vehicles and were then asked to state if they had registered the presence of a particular object (e.g. “broken headlight”) with questions phrased either with the use of the indefinite or definite article as in “Did you see a/the...”. Again, the presupposition inserted with what could be seen as a fairly minor linguistic alteration was showed to significantly impact judgment. Later research in cognitive psychology points to similar effects. Fausey and Boroditsky (2010) looked into agentive/non-agentive constructions and concluded that language-initiated conceptualisation differences can impact individuals’ blame attribution and assessment even if they have at their disposal a non-linguistic tertium comparationis which could be expected to override language evidence.

What is more, the growing body of experimental research indicates that one’s mother tongue shapes one’s cognitive capacities in the sense that being required to keep track of certain aspects of events makes us pay attention to those aspects differently, thus for instance influencing our memory of those aspects of events. This line of research shows that the choice of construal – motivated by the parameter of conventionalisation (cf. e.g. Langacker, 2008) influences cognition in a number of respects. Fausey and Boroditsky (2011) demonstrate, for example, that speakers of languages in which one conventionally codes the agent irrespective of whether the action was intentional, as opposed to users of languages where the speaker can choose not to code the agent if the action was unintentional with no detriment to the conventionalisation of the expression, will differently remember agents of intentional and unintentional actions. Examples such as this one correspond with Langacker’s (1987, 1991, 2007, 2008) construct of “profiling”, a sub-mechanism of prominence, where a linguistic expression can be used to highlight different substructures within a particular base. Langacker (2008) discussed profiling alongside “trajector”/”landmark” alignment, whereby in the latter participants of a scene are either more primary attention foci (“trajectors”) or less primary ones (“landmarks”).

The objective in this paper is to investigate language-prompted conceptualisation in the temporal domain and to see how the choice of construal influences our reasoning about temporally-embedded events.
To begin with, while we do not perceive time directly, it is a commonly accepted conviction that time is real in the physical sense. In what Evans refers to as the “common-place view” time is conceived of as “objectively embedded in the external world” (Evans, 2004: 3, cf. Langone, 2000). An opposing position is that the individual’s temporal experience can neither be “be equated with an objectively real entity inhering in the ‘world out there’” (Evans, 2004: 8) nor with “a second-order concept parasitic on ‘more basic’ kinds of experiences, such as external sensory experience”. Instead, Evans (2004: 9) posits, “time appears ultimately to derive from perceptual processes which in fact may enable us to perceive events” from which it follows that “temporal experience may be a pre-requisite for abilities such as event perception and comparison, rather than being an abstraction based on such phenomena”.

With regard to time perception, then – and duration as a case in point – it should be pointed out that humans experience duration differently on different occasions, in the sense that a given amount of time can be perceived as taking longer or shorter to elapse. Hoff and Pötzl (1934) talked about “Zeitlupenphänomen”, that is, the experience of time passing slower on the psychological level. In fact, the term – translated as “protracted duration” – can be found as an entry in “A Dictionary of Hallucinations” where it is characterised as a type of “tachypsychia”, a subtype of “dysynchronisation” or “time distortion”, and contrasted with “quick motion phenomenon” and “temporal compression”. Flaherty (1999) talks about “temporal compression” and “protracted duration” – which instantiate what he terms “variation in lived time” (Flaherty, 1999: 114) – as relative to “synchronicity”, i.e. the undistorted experience of the passage of time. Flaherty postulates an “S-shaped model” where temporal compression is correlated with low density of conscious information processing, synchronicity is experienced with moderate degrees of density, and protracted duration is effected via the increased density of experiential input. In turn, Tse et al. (2004) talk about “time’s subjective expansion” which they understand as “the subjective expansion of perceived duration” (Tse et al., 2004: 1171) experienced during short and dangerous events such as car accidents or robberies. Indeed, factors that condition the mechanisms of protraction, and by analogy those of compression, in time perception relate to physical exhaustion, high levels of stress and trauma, concentration, novelty (as opposed to routine) but also disorders like migraine as well as epilepsy, or might be resulting from the use of psychotomimetic substances such as LSD, cannabis, mescaline or cocaine (Blom, 2010; Flaherty, 1999; Evans, 2004; Cheng et al., 2006). This is compatible with Ornstein’s (1997) claim that the quality of temporal experience has to do with its strain on memory. In that vein, Eagleman (2012) points out that...
our memory is more engaged when we are faced with new situations whereby
the array of novel stimuli to be registered is vast, compared to well-known re-
peated scenarios which require little registering anymore. This could, then, be
a viable explanation of the commonplace observation that time seems to be
passing more slowly as we are younger – another explanation being simply
that a particular time span is increasingly insignificant proportionately to one’s
age (cf. Krukowski, 2010). An instantiation of this is what came to be known as
“the oddball effect” (Pariyadath and Eagleman, 2007, 2008). The mechanism at
work here is that a repeated visual stimulus is perceived to have been displayed
for a shorter time interval than a stimulus that is displayed once only, even
though in terms of physical time the stimuli are not different.

On another level, technically identical amounts of time are perceived as dif-
ferently long if they are parts of a sequence. Alter (2010) gives the example of
many-hour flights where the first hour is experienced as elapsing slower than
those that follow. This “now-relative” estimation of duration is also explored in
studies where individuals assess their willingness to postpone a reward. Alter
points out that the difficulty of postponing a positive experience by a given
amount of time decreases as the temporal distance separating the subject from
the point in time grows (cf. e.g. Mischel et al., 1989). That is to say, a temporal
magnitude such as a day or hour will be taken to ‘mean’ differently depending
on what we could call the “temporal context”.

Another portion of valuable insights into time perception comes from
cross-domain analysis where magitudinal dimensions are seen to interact.
For instance, Oliveri et al. (2008) found that the numerical value of a perceived
stimulus influences subjects’ duration judgements, i.e. the subjects’ perceived
duration is underestimated with small numbers like “1” and overestimated
with larger numbers like “9”. Likewise, Javadi and Aichelburg (2012) showed a
bi-directional dependence between judgements of duration and numerosity.

In this paper we focus on duration which can be conceived of as a facet of
transcience, alongside “succession” and “anisotropicity” (Evans, 2013). In that
tripartite distinction succession is “the felt experience of the passage involving
earlier and later experience types”, and anisotropicity is “the felt experience that
the passage exhibits inherent asymmetry – a felt distinction between future,
present and past” (Evans, 2013: 519), while duration functions as “the felt expe-
rience of the passage constituting an elapse”. To address the problem of time
quantification, we have to start from the premise that time gets construed spa-
tially, a claim that – as Evans (2013: 16) aptly points out – has been illustrated
both by research into language (cf. Clark, 1973; Alarson, 1994; Evans, 2004;
Radden, 2003; Núñez and Sweetser, 2006) and more psychologically-oriented
investigation (Boroditsky, 2000; Gentner et al., 2002; Casasanto and Boroditsky,
2008; McGlone and Harding, 1998; Núñez et al., 2006; Fedden and Boroditsky,
The alternate construals of time examined in this paper can then be conceived of as differing primarily in prominence. In the “cumulative” construal time quantities – seconds, minutes, weeks and months – are aggregated, in the material analysed the aggregates amount to 30 (in the case of seconds and minutes), 2 (in the case of weeks) and 6 (in the case of months). The fractional construal draws on Langacker’s (2008: 66–70) “profile”/“base” configuration whereby a fraction (in our case “half”) is profiled from a superordinate structure of a minute, hour, month and year.

4 Event Conceptualisation at Different Levels of Temporal Granularity

The studies reported in the following sections look into alternate construals of time quantities at four levels of resolution: seconds/minute (Level 1), minutes/hour (Level 2), weeks/month (Level 3) and months/year (Level 4) realised linguistically through nominal phrases. To maximally harmonise the stimuli at the examined levels of time organisation, each level features an event scenario using a case of force-dynamic pressure opposition (Talmy, 2000) to be conceptualised by respondents – these are 1a, 2a, 3a and 4a. This was to ensure there is a “common denominator” for comparisons. All subjects were tested with the use of stimuli from Levels 1–4 and filler stimuli were inserted. What is more, two datasets were created. As stimuli and instruction were in English, the sets varied with respect to the subjects’ mother tongue. The L1 dataset comprises evidence from speakers whose mother tongue was English while the L2 dataset was compiled with the use of data from Polish native speakers. The L1 subjects were tested online1 with the use of the Clickworker platform while experiments with L2 respondents were conducted at the Institute of English Studies, University of Łódź, in Poland. Subjects in the “Polish” group answered on paper sheets and were tested in groups of up to 20 to make sure they did not communicate in the process.

4.1 Level 1

In this study I investigated the most fine-grained of the four levels of time quantification under scrutiny, i.e. the difference between the cumulative structuring – “thirty seconds” – and the case of fractional structuring – “half a minute”. This study comprised two variants: 1a and 1b.

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1 To take part, subjects had to register and consent to their responses being used. The subjects received nominal compensation.
Study 1a
In the first variant the L1 cumulative and fractional conditions tested 35 and 36 subjects, respectively. The L2 dataset had 52 participants who were evenly assigned to the two conditions. Subjects were asked to estimate how hard it would be for them to stay underwater for “thirty seconds” (cumulative condition) and “half a minute” (fractional condition). They placed their estimations on a Likert-type scale from 1 (“very easy”) to 7 (“extremely hard”).

Results
The means were 3.51 (cumulative) and 3.39 (fractional) for the L1 set and 2.77 (cumulative) and 4.19 (fractional) for the L2 set. The difference is statistically significant in the case of the latter with p-value=0.014 in two-tailed T-Test, t-value=2.55. As Polish-speaking participants estimated on average that staying underwater for “half a minute” is harder than accomplishing the analogous for “thirty seconds”, these findings suggest that cumulative and fractional constructions of temporal magnitudes prompt magnitudinally different meanings in the sense that a fractional construal makes the constructed quantity appear bigger.

Study 1b
In the second version of the study the objective was to further test the findings from 1a that the fractional construal of time leads to the temporal quantity being conceptualised as bigger. For that purpose, participants answered an open format question about how many words they would be able to type on a computer keyboard. Analogously to 1a, participants were assigned to two conditions as the time allotted for typing was expressed cumulatively (35 L1 subjects/28 L2 subjects) and fractionally (36 L1 subjects/28 L2 subjects).

Results
The results corroborated the findings from 1a. The mean number of words in the cumulative condition was 37.3 (L1) and 23.41 (L2) and in the fractional condition 37.72 (L1) and 38.57 (L2) with the difference being statistically significant for the L2 set (p-value=0.030 in one-tailed T-Test, t-value=1.916317). Therefore, L2 – but not L1 – participants conceptualised “half a minute” to ‘mean’ more time to be used for typing.

4.2 Level 2
In the second study we looked into a more schematic level of time organisation as reflected in the cumulative vs. fractional configurations for the minutes/hour tier.
2a
At this level, the event scenario relying on force-dynamically structured activity was: “How hard is it for you to run nonstop for half an hour?”. In the L1 group 36 and 35 subjects were tested in the cumulative and fractional conditions while the L2 group comprised 54 subjects evenly distributed between conditions.

Results
The cumulative scores were 4.94 (L1 subjects) and 4.44 (L2 subjects) whereas the fractional scores were 4.94 (L1 subjects) and 4.00 (L2 subjects). In neither of the datasets was there any statistically corroborated difference between conditions.

Study 2b
In the second variant at this level participants were asked to estimate their emotional response to a scenario as follows:

Your friend, who is often unpunctual, is thirty minutes/half an hour late for a meeting with you at a bus stop. He does not answer his phone. How angry would you be?

In the L1 dataset 35 and 36 replies were collected in the cumulative and fractional conditions, respectively, whereas a total of 52 participants were divided evenly between the L2 cumulative and fractional conditions. Estimations were positioned on a scale from 1 (“not at all angry”) to 7 (“extremely angry”).

Results
In the cumulative condition the estimated mean rate of anger was 4.57 (L1) and 4.92 (L2). In the fractional condition the rates were 4.56 (L1) and 4.46 (L2) which in the case of the L2 data could imply a different trend than in Study 1, but the results are not statistically significant. With this in mind, in order to confirm or disconfirm the tentative finding that at this level of temporal organisation the effect of construal selection is the opposite of what was found in Study 1, or is non-existent, a follow-up study was done with another group of L2 subjects – 28 in the cumulative condition and 27 in the fractional condition. In the replication the means for the two groups – 5.46 and 5.59 for cumulative and fractional constructions respectively – once more pointed to no statistically confirmed effect. A joint mean score from the two samples – 5.20 (cumulative) and 5.04 (fractional) – confirms the result.
Study 2c
To obtain a more comprehensive account, in another variant of this study subjects were requested to assess the difficulty of preparing a meal for an unplanned visitor who would show up in “thirty minutes” (36 L1 subjects, 33 L2 subjects) or “half an hour” (35 L1 subjects, 42 L2 subjects). Assessments were again placed on a scale, from 1 (“very easy”) to 7 (“very hard”).

Results
The cumulative/fractional means are 2.94/3.23 for L1 data and 2.61/2.61 for the L2 data – which lends credence to the hypothesis hinted at by the results in 2a as well as 2b – that at the level of minutes/hour the alternation of construals has no traceable consequences for meaning-making.

Study 2d
In order to exclude the probability that the lack of statistically significant difference was a matter of the particular context used or the question format, a different situational setting and question format were used to obtain more evidence. For this I implemented an open-answer template asking how many pages of a medium-sized book participants would be able to read in “thirty minutes” (cumulative condition) and “half an hour” (fractional condition). In the former 36 L1 responses and 27 L2 responses were collected while in the latter 34 L1 and 26 L2 replies were considered.

Results
We find that the difference in the mean page counts in the cumulative condition (38.25 for the L1 dataset and 41.07 for the L2 dataset) and in the fractional condition (29.00 for the L1 dataset and 29.36 for the L2 dataset) is not statistically significant.

All in all, the results for the cumulative/fractional differentiation at the minutes/hour level – as evidenced by 2a, 2b, 2c and 2d – do not signal statistically significant semantic-conceptual implications of temporal construal choice.

4.3 Level 3
Study 3 proceeded to examine the meaning-making potential of temporal construals at the level of weeks/month, with the cumulative category being instantiated by the expression “(around) two weeks” and its fractional analogue expressed through “(around) half a month”. The study comprised three event scenarios.
Study 3a
Consistently with stimuli at the other tested levels, the first set drew on force dynamics in the event scenario which was:

How hard would it be for you to lose 3 kilogrammes of your weight in around two weeks/half a month?

In the cumulative condition answers were computed from 36 subjects in the L1 dataset and 27 in the L2 dataset. The fractional construction was tested with 35 and 27 participants in the respective datasets.

Results
The differences between cumulative scores – 4.11 for L1 and 4.18 for L2 – and their fractional counterparts – 4.43 for L1 and 3.70 for L2 – are not statistically corroborated to be significant.

Study 3b
In the second variant subjects gave their assessments of the difficulty of passing a hard exam after studying one hour a day for alternately “around two weeks” (35 participants in L1 and 33 in L2 ) and “around half a month” (36 participants in L1 and 40 in L2) – with the lowest degree of uneasiness being denoted by 1.

Results
The means for the cumulative and fractional construals were respectively 5.6 (L1)/2.36 (L2) and 5.58 (L1)/2.40 (L2). While the cross-condition consistency of score divergence between datasets is remarkable and could be indicative of a curious cultural pattern, no significant difference is identified between the conditions within datasets.

Study 3c
The third component of Study 3 examined the construction of temporal meanings with respect to a scenario where subjects were asked about how hard they would find it to have no internet access for the alternately construed periods. Responses were collected from 35 (L1)/33 (L2) participants assigned to the cumulative condition and 36 (L1)/35 (L2) participants assigned to the fractional condition.

Results
In the cumulative and fractional conditions respective scores of 5.11 (L1)/4.73 (L2) and 5.33 (L1)/5.31 (L2) were obtained. Those results thus point to no significant differences.
4.4  Level 4
In Study 4 we investigated the most schematic out of the four levels of temporal granularity by comparing construals instantiated by the expressions “six months” (cumulative) and “half a year” (fractional).

Study 4a
The first event scenario we report for this level – again structured on the basis of a force-dynamic relation – required the participants to estimate how hard they would find it not to eat their favourite dish for the duration of “six months” (cumulative) or “half a year” (fractional). In the former condition 36 (L1)/27 (L2) subjects responded and in the latter a total of 35 (L1)/27 (L2) replies were gathered.

Results
The scores for the cumulative condition – 3.94 (L1)/4.07 (L2) – and the fractional condition 3.89 (L1)/4.30 (L2) – do not display statistically confirmed difference.

Study 4b
In the second component of the study subjects gave numerical estimates of how many pages of their BA dissertations they would be able to write in “six months” and “half a year”. In the cumulative and fractional conditions 24 (L1)/32 (L2) and 27 (L1)/31 (L2) subjects responded, respectively.

Results
The means were 67.17 (L1)/32.97 (L2) in the cumulative condition and 53.37 (L1)/35.7 (L2) in the fractional condition, pointing to no statistically confirmed effect.

Study 4c
To confirm or disconfirm the lack of effect observed in 4a and 4b, in another variant of the study participants envisaged that their partner got a scholarship and leaves for the U.S. Given that the subjects could not accompany him/her, they were to grade how anxious they would feel about the separation – (1 – “not at all anxious” and 7 – “extremely anxious”) – lasting alternately “six months” (cumulative) and “half a year” (fractional). The cumulative and fractional construction were tested with 35 (L1)/27 (L2) and 36 (L1)/27 (L2) subjects.

Results
The anxiety estimation means for the cumulative and fractional conditions were 4.94 (L1)/3.88 (L2) and 4.83 (L1)/4.85 (L2). The results from the L2 dataset
indicate an effect at this level of temporal granularity whereby the fractional construction of temporal magnitude makes it appear larger (p-value is 0.01961 in two-tailed T-test; t-value=2.117428). No effect is identified in the L1 dataset.

5 Meta-Cognitive Intuitions

To see whether individuals predict that the selection of construal is going to influence cognition, additional studies were conducted. Participants were presented with scenarios from the main studies but here the alternate construals were explicitly provided to enable intuitive meta-cognitive assessment. Table 1. and Table 2. outline the responses from L1 and L2 speakers – 71 of the former and 73/54 (for 2a, 3a and 4a) of the latter.

The findings shed light on the results of the main studies reported above in two important ways. First, they consistently match the hypothesis that it is the fractional construal of time that can have the ‘magnifying’ effect. Notably,

<table>
<thead>
<tr>
<th>Temporal granularity</th>
<th>Study</th>
<th>Fractional magnifies(^2) %</th>
<th>Cumulative magnifies %</th>
<th>No effect %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>1a</td>
<td>43.66</td>
<td>19.72</td>
<td>36.62</td>
</tr>
<tr>
<td></td>
<td>1b</td>
<td>28.17</td>
<td>32.39</td>
<td>39.44</td>
</tr>
<tr>
<td>Level 2</td>
<td>2a</td>
<td>39.44</td>
<td>11.27</td>
<td>49.30</td>
</tr>
<tr>
<td></td>
<td>2b</td>
<td>38.03</td>
<td>21.13</td>
<td>40.85</td>
</tr>
<tr>
<td></td>
<td>2c</td>
<td>36.62</td>
<td>16.90</td>
<td>46.48</td>
</tr>
<tr>
<td></td>
<td>2d</td>
<td>32.39</td>
<td>19.72</td>
<td>47.89</td>
</tr>
<tr>
<td>Level 3</td>
<td>3a</td>
<td>45.07</td>
<td>22.54</td>
<td>32.39</td>
</tr>
<tr>
<td></td>
<td>3b</td>
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<tr>
<td></td>
<td>3c</td>
<td>57.75</td>
<td>14.08</td>
<td>28.17</td>
</tr>
<tr>
<td>Level 4</td>
<td>4a</td>
<td>50.70</td>
<td>15.49</td>
<td>33.80</td>
</tr>
<tr>
<td></td>
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<td>33.80</td>
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<td>4c</td>
<td>47.89</td>
<td>16.90</td>
<td>35.21</td>
</tr>
</tbody>
</table>

\(^2\) While there will be no full synonymy or antonymy between construals, their functioning will be interdependent and therefore this label could at least in some cases be re-profiled into “cumulative de-magnifies”.
the consistency is unfaltering for the L2 dataset where the proposition that the cumulative construal makes the magnitude appear as bigger was unanimously rated as the least likely, with the proportion of subjects who went for this variant ranging from a mere 7% to 22%. In the L1 dataset there is one exception to that pattern, as in 1b it is the cumulative construction that is picked more frequently as the magnifying one. It has to be pointed out, though, that the difference is that of 4% which is much less pronounced than what we see in the data when the fractional variant is judged to have a magnifying effect.

The second insight is, however, that individuals’ intuitions about the consistency and size of the ‘magnifying effect’ of the fractional construal only partly match our findings. First of all, in the L1 dataset the effect was predicted to be present at all levels of temporal resolution while no such effect has been found. What is more, L2 subjects predominantly expected the magnifying effect to be strong at level 2, i.e. for the minutes/hour configuration, and level three, i.e. for the weeks/month configuration, where no effect was in fact found. Conversely, only 34.24% (the 4th lowest score out of all the 12 cases under consideration)

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3 One more case that could be mentioned is 4b (L1) where the distribution of replies favouring either of the three options is relatively balanced with pro-cumulative and pro-fractional answers scoring 29.58% and 33.80%.

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**TABLE 2  L2 predictions of the construal alternation effect**

<table>
<thead>
<tr>
<th>Temporal granularity</th>
<th>Study</th>
<th>Fractional magnifies %</th>
<th>Cumulative magnifies %</th>
<th>No effect %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>1a</td>
<td>34.24</td>
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<td></td>
<td>1b</td>
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<td>17.80</td>
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<td>7.41</td>
<td>70.37</td>
</tr>
<tr>
<td></td>
<td>2b</td>
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<td>10.95</td>
<td>45.20</td>
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<td></td>
<td>2c</td>
<td>42.47</td>
<td>17.80</td>
<td>39.72</td>
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<td>52.05</td>
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<td>22.22</td>
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<td>9.58</td>
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<td></td>
<td>3c</td>
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<td>10.95</td>
<td>45.20</td>
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<tr>
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<td>4b</td>
<td>28.76</td>
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<td></td>
<td>4c</td>
<td>48.61</td>
<td>6.90</td>
<td>44.44</td>
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of subjects predicted an effect would be triggered by the fractional construal in 1a where the effect was found to be most robust. A cross-linguistic pattern that should be mentioned is the one observed for predictions about the 2a event scenario. In both the datasets 2a scores highest for “no effect” predictions.

6 General Discussion

The findings from Studies 1–4 point to significant asymmetries in meaning-making potential between construals of temporal magnitudes. Importantly, those asymmetries are not analogous across levels of temporal organisation and between L1 and L2 speakers. As far as the L2 dataset goes, at the most fine-grained level of “30 seconds”/”half a minute” (Level 1) we identified the ‘magnifying’ effect of the fractional structuring of time in two independent studies. Passing on to the more schematic tier of “30 minutes”/”half an hour” (Level 2), however, in three studies we found no effect even though the “seconds/minute” and “minutes/hour” levels could appear to be otherwise highly analogous. The findings from Level 2 are then similar to what is found in two studies conducted for Level 3 where no effect has been identified between construals expressed in the form of “around two weeks” and “around half a month”. Vitaliy, the effect then re-surfaces at Level 4 where the fractional construction – in parallel to what we saw at Level 1 – prompts the quantities of time to be conceptualised as bigger. In summary, then, statistically significant differences conditioned by the choice of construal have been found at two out of four levels of temporal granularity. It is essential to note that at the two levels where conceptualisation asymmetries have been indentified they are consistent, i.e. it is the fractional construal of time that prompts the ‘bigger’ conceptualisation. A critical point is that in the L1 dataset no effects have been identified.

While this study has attempted to use stimuli yielding themselves to comparison, with the component of force-dynamic pressure being used for event-structuring at each level, how exactly the type of time-framed event – and the subject’s conceptualisation thereof – interacts with temporal cognition remains to be further tested. Variation in that respect is implied by the results from Level 4 where it could be hypothesised that the ‘separation’ scenario (4b) is especially emotionally engaging, which makes it more conducive to construal-prompted malleability. Such cross-scenario variation is interestingly matched by the findings on the months/year configuration from the meta-cognitive analysis reported in Section 5, with 29% and 49% of L2 speakers predicting the fractional construal to have a magnifying effect in the BA dissertation scenario (4b) and the separation scenario (4c), respectively.
The question then is what properties of the “seconds/minute” and “months/year” levels make them more susceptible to what could be termed the “construal alternation effect” observed in non-native speakers of English. One characteristic to be considered is that these are, respectively, the most and the least specific levels examined. As a consequence, they are, conversely, experienced in differently direct fashions, with magnitudes up to “30 seconds”/”half a minute” being relatively close to “the specious present” (Clay, 1882; James, 1890). It could still be surprising, however, that at the more schematic level of “30 minutes”/”half an hour” the effect no longer operates. A viable explanation is that the semantic-conceptual interchangeability of cumulative and fractional construals is not analogous for the two strata. This is confirmed by corpus evidence reported in Deckert and Pęzik (2014), indicating that there are conventionalisation asymmetries reflected in the use of cumulative and fractional constructions which are then disanalogous across levels of temporal structure (Table 3). This suggests that for the “magnifying” effect of the fractional construal to hold, the fractional construal has to be the less conventionalised of the two types. This hypothesis finds further confirmation at Level 4 (Table 3) of our analysis where conventionalisation is decidedly higher for the cumulative construal, i.e. “6 months”, compared to the fractional counterpart.

Therefore, the lower conventionalisation of a construction could be responsible for the ‘magnification’ of the quantity that it structures. Another explanation – supported by the findings from the post-experiment study on meta-cognitive intuitions – could be that fractional construals explicitly draw on the superordinate structure by coding it in the linguistic expression, therefore activating a larger magnitude which is not directly activated in cumulative construals.

The question remains why native speakers of English appear to be insusceptible to construal alteration. It could be the case that L2 speakers pay more attention to linguistic form used to phrase event scenarios, while to L1 speakers

<table>
<thead>
<tr>
<th>Temporal granularity</th>
<th>Linguistic representation</th>
<th>Cumulative construal</th>
<th>Fractional construal</th>
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<tr>
<td>Level 1</td>
<td>seconds/minute</td>
<td>30 seconds/half a minute</td>
<td>310</td>
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<tr>
<td>Level 2</td>
<td>minutes/hour</td>
<td>30 minutes/half an hour</td>
<td>653</td>
</tr>
<tr>
<td>Level 4</td>
<td>months/year</td>
<td>6 months/half a year</td>
<td>3948</td>
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</table>
form is more ‘transparent’. This would be supported by accounts from dual-process theories where it is postulated that because of the relative disfluency that comes with stimuli presented in one’s L2 (French-Mestre, 2002; Segalowitz, 2010), L2 processing will be more reflective and controlled. In that vein, our findings could be interpreted against the backdrop of the research on the role of native vs. non-native language use in moral reasoning (Costa et al., 2014; Cipolletti et al., 2016) and affective processing (Caldwell-Harris, 2015). One relevant insight is that the use of a foreign language could be resulting in greater psychological distance which in turn might be making the problems expressed more abstract and the subject’s response less emotional.

7 Conclusions

Overall, the findings point to intralingual and intracultural semantic-conceptual asymmetries which are at loggerheads with the postulates of full synonymy between linguistic expressions. As has been demonstrated for L2 speakers, the language-initiated meaning construction process can be differently routed – leading to a temporal magnitude being conceptualised as larger or smaller – depending on the choice of temporal construal. That the effect can be detected even in experimentally isolated local contexts, and with the use of short linguistically-expressed scenarios, indicates that in real-life situations, where stimuli interact and constantly get aggregated, such effects could be more pronounced.

The experiments reported in this paper show that language serves as a powerful tool shaping our perception of temporally-embedded events. The choice of construal influences the construction of temporal meaning – effecting what we could term “language-induced time warping” – but the influence goes beyond the domain of time as the alternate constructions of temporal magnitudes differently prompt conceptualisers to reason about types of experience that is not primary temporal, like emotions or capabilities. The findings acquire additional significance once it is acknowledged how frequently time is the subject of everyday exchanges and how relevant and consequential the linguistic expression of time quantities is discursively.

An important variable that has been showed to condition the effect (and lack thereof) is the speaker’s mother tongue. Based on the series of empirical cases reported here, it appears that with stimuli presented in their L1 conceptualisers are – at least more than conceptualisers reasoning about stimuli presented in their L2 – impervious to alternate construal coding. Interestingly, both L1 and L2 speakers with a very high degree of consistency predict
construals to significantly impact thinking, and both groups are generally in agreement as to what the effect could be. At the same time, evidence from both the groups confirms that we are not very proficient at estimating the effects of construal on event conceptualisation, at least in the temporal-magnitude domain, with a tendency to underestimate some choices and overestimate others. The difference between the L1 and L2 speakers that remains to be further examined is that the former seem to overestimate the effects more conspicuously.

With those low prediction success rates, it has to be borne in mind that by realising how the choice of construal influences temporal cognition we could better craft our utterances to achieve communicative objectives. By the same token, being aware of what effect alternate structuring has on duration perception, we could identify the effects generated by our interactants’ utterances. Considering this, one line of work that can benefit from the type of examination presented here is deception detection, where linguistic choices can serve as cues integrated with other types of evidence (Vrij et al., 2000; Ekman, 1985/1992; Sporer, 1997; Lykken, 1998), including the communicator profile, non-linguistic behaviour and physiological responses – such as electrodermal activity.

References


