Hurford Disjunctions: Beyond Redundancy and Triviality[1]

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Abstract. We present two experiments on *Hurford Disjunctions* (Hurford, 1974, and much subsequent work) and their conjunctive counterparts, testing key predictions of the two dominant approaches in the literature: the *Non-Redundancy* approach (Katzir and Singh, 2013) and the *Non-Triviality* approach (Schlenker, 2009). Our results challenge core predictions of both accounts, suggesting that neither fully captures the actual patterns. We explore the implications of these findings and argue that the notion of *super-redundancy*, introduced by Kalomoiros (2023a), provides a promising framework for explaining our results. Finally, we draw connections to recent developments in the literature on presuppositions, particularly to insights from Mandelkern et al. (2020) and Kalomoiros and Schwarz (2024), which could help refine our theoretical account of redundancy phenomena.

Keywords: Hurford disjunctions, redundancy, triviality, local contexts

1. Introduction

Informativity is a core communicative principle: when asserting a sentence, a speaker must convey information that is not already part of the interlocutors' common ground (Stalnaker, 1974). This principle is illustrated in the contrast between (1) and (2).

(1) CONTEXT: *we know that John lives in France*.
#John lives in France.

(2) CONTEXT: *we have no idea where John lives*.
John lives in France.

In the standard approach that models the context as a set of possible worlds and assertion as the intersection of the proposition expressed by a sentence S with the context C (Stalnaker, 1978), the informativity constraint can be expressed as follows:

(3) **Global informativity:** A sentence S is infelicitous in a context C if $C \cap [\![S]\!] = C$

The constraint in (3) is global because it refers to S as a whole, without any consideration of the role of parts of complex sentences. As is well known, however, global informativity alone is insufficient. Consider the contrast below:

(4) CONTEXT: *we have no idea where John lives*.
   a. John resides in Paris.
   b. #John resides in Paris and he lives in France.

Taken as a whole, (4a) and (4b) convey the same information in context (i.e., the proposition that John resides in Paris), so (3) treats them on par. Intuitively, however, (4b) is infelicitous,

[1]We would like to thank Patrick Elliott, Raven Zhang, the members of the Penn Meaning Lab and of the Düsseldorf semantics colloquium, as well as audiences at ZAS, IJN and SuB29 for helpful feedback.

because the second conjunct is *locally* uninformative, since residing in Paris entails living in France. Local violations of informativity also appear in the disjunctive counterpart of (4b) below, an instance of so-called 'Hurford Disjunctions' (Hurford, 1974):

(5) CONTEXT: *we have no idea where John lives*.
   a. John lives in France.
   b. #Either John lives in France or he resides in Paris.

Paralleling the above, the disjunction in (5b) conveys the same information as (5a) in context (i.e., the proposition that John lives in France), so it is not ruled out by (3). However, the second disjunct is locally uninformative as it does not add anything to the meaning of the overall disjunction.

To account for such local violations of informativity, two major theoretical approaches have been proposed in the literature: the Non-Redundancy approach (Katzir and Singh 2013, a.o.) and the Non-Triviality approach (Schlenker 2009, a.o.). We review these approaches in the next section. Here we will note three questions raised by these theories. First, both theories have a symmetric and an asymmetric version: on the symmetric version the order in which the (con/dis)juncts appear doesn't matter for oddness judgments, whereas on the asymmetric version it does. This naturally raises the question which version is correct:

Q1 EFFECT OF ORDER: When one 'junct entails the other, does the order of the 'juncts impact judgments about oddness?

Second, neither theory predicts any effect of whether negation is present, and of the choice of connective, but, as we will see, intuition suggests that both might matter:

Q2 EFFECT OF NEGATION: Does it matter whether the 'juncts contain negation?

Q3 EFFECT OF CONNECTIVE: Does it matter whether the main connective is conjunction or disjunction?

This paper presents two experiments that explore each of these questions. The remainder of the paper is structured as follows. Section 2 reviews the Non-Redundancy and Non-Triviality approaches, recapitulates how they relate to the questions above, and shows what exact predictions they make with respect to them. Sections 3 and 4 describe our experiments testing these predictions. Section 5 discusses the implications of our findings, proposing that the notion of *super-redundancy* (Kalomoiros, 2023a) helps explain key puzzles; we also draw connections to recent results in the presupposition literature to explore directions for further theoretical refinements in light of our results (Mandelkern et al., 2020; Kalomoiros and Schwarz, 2024).

2. Two theories

2.1. Non-Redundancy

The Non-Redundancy approach (Katzir and Singh 2013; see also Meyer 2013; Mayr and Romoli 2016) is based on the constraint in (6) below, which in turn makes reference to the notion of *redundant constituent* in (7) (see also Fox 2008; Kalomoiros 2023a; the way we have opted to present the Non-Redundancy approach deviates slightly from Katzir and Singh (2013), but remains faithful in spirit):

(6) **Non-Redundancy:** A sentence S is odd in a context C if it contains one or more redundant constituents.

(7) **Redundant constituent:** A constituent E is redundant in a sentence S in context C iff there exists a constituent E' of S that contains E, and E' can be replaced by one of its own sub-constituents E'' such that (i) the resulting S' is contextually equivalent to S in C and (ii) E is no longer present in S'.

Since the definition of redundancy above does not make reference to order, polarity, or connective type, absent any other sources of oddness, this approach makes the following predictions, in relation to our three guiding questions: order should not matter, the presence of negation should not matter, and there should be parallel order effects across connectives.

The examples below illustrate these predictions (though as indicated by our use of '#$^?$', reported judgments in the literature are not uniform). We start with the predictions that negation and choice of connective shouldn't matter:

(8) *No effect of negation*
   a. # Either John resides in Paris or he lives in France.
   b. #$^?$Either John doesn't reside in Paris or he doesn't live in France.

(9) *No effect of connective*
   a. # Either John resides in Paris ***or*** he lives in France.
   b. # John resides in Paris ***and*** he lives in France.

Finally, since **Non-Redundancy** penalizes all redundant constituents equally, it does not predict that order should matter. Thus, the following should be equally odd:

(10) a. # John resides in Paris and he lives in France.
   b. #$^?$John lives in France and resides in Paris.

(11) a. #Either John lives in France or he resides in Paris.
   b. #Either John resides in Paris or he lives in France.

However, both the prediction that there is no effect of negation and that there is no effect of order have been challenged based on informal judgments. Regarding the effect of negation, Kalomoiros (2023a) argues that (8b) is notably better than (8a). As for the effect of order, there is a long-standing intuition that conjunctions like (10b) are more natural than conjunctions like (10a). However, order seems irrelevant for disjunctions, as (11a) and (11b) are judged equally odd. In other words, these reported intuitions suggest that order plays a role only in conjunction, not disjunction.

The response to the issue of order effects has been of two types. On the one hand, Katzir and Singh (2013) argue that, in general, order-based effects in conjunction are only apparent and arise due to independent factors including reanalysis of verb meanings (e.g., reinterpreting *resides* as not necessarily entailing *lives*) or presuppositional asymmetries. Additionally, they highlight that in some cases, conjunctions appear redundant in both orders, suggesting no systematic asymmetry. For instance, they argue that NP-level conjunctions show clear symmetric effects:

(12) a. #John lives in France and Paris.

b. #John lives in Paris and France.

These cases support the idea that conjunction asymmetry is not a robust phenomenon, at least at the NP level. However, while (12) provides valuable data, it does not conclusively settle the empirical controversy surrounding order effects. It remains possible that order plays a role at levels above the NP, and it is unclear whether reanalysis and presuppositions account for all apparent cases of asymmetry in conjunction (see Mayr and Romoli 2016 for discussion). This issue then is still in need of systematic empirical testing.

The second response takes the intuition of order effects at face value and attempts to redefine the **Non-Redundancy** constraint to make it explicitly sensitive to order. Indeed, it is possible to define an incrementalized version of this constraint that captures the putative contrast between (10a) and (10b). We will not go through the details of this version (see Mayr and Romoli 2016); the crucial point is that this incrementalized constraint makes redundancy violations sensitive to linear order. In (10a), *France* follows *Paris* linearly, triggering a redundancy violation; in (10b), *Paris* follows *France*, so the same violation does not occur. While this adjustment accounts for asymmetry in conjunction, it introduces the prediction that disjunctions should also exhibit order effects. Specifically, the incrementalized constraint predicts a contrast in (11), where (11a) should contain a redundant constituent, but (11b) should not.

In summary, the formulation of **Non-Redundancy** in (6) makes both conjunction and disjunction symmetric, whereas the incrementalized version makes both conjunction and disjunction asymmetric. Neither option fully aligns with the intuitions found in the literature. Moreover, as we mentioned, those intuitions themselves are not entirely uniform. Thus, the first step must be a more systematic empirical investigation of these effects.

2.2. Non-Triviality

Another influential approach is the Non-Triviality approach (Schlenker 2009, a.o.). This approach is based on the notion of *local context*, which determines how a constituent contributes to the truth conditions of a sentence within a given context. We will sketch this notion informally here; the relevant formal details can be found in Schlenker (2009).

In a nutshell, the local context of a constituent of a sentence is the subset of worlds in the context in which the truth value of that sentence depends on that constituent. Consider, for instance, the conjunction $S = (p \wedge q)$. We can deduce the local context of q as follows: in worlds where p is false, the truth value of S does not depend on q, since S will be false regardless of whether q is true or false; conversely, in worlds where p is true, the truth value of S does depend on q: S is true if q is true and false otherwise. From this, we conclude that the local context of q is the subset of the context where p is true, i.e., $C \cap p$ (where C represents the global context). Thus, the key intuition behind local contexts is that they define the portion of the context that comprehenders focus on when assessing a constituent's impact on the truth conditions of the sentence. Naturally, this must be the part of the context where the constituent makes a difference.

Following this logic, the local context for any constituent can be computed. In its basic version, called 'symmetric', this computation takes into account all other material in the sentence. The relevant local contexts for conjunction and disjunction are as follows:

(13) CONJUNCTION: $p \wedge q$ given a context C
   a. The symmetric local context of the first conjunct p is $q \cap C$.
   b. The symmetric local context of the second conjunct q is $p \cap C$.

(14) DISJUNCTION: $p \vee q$ given a context C
   a. The symmetric local context of the first disjunct p is $\neg q \cap C$.
   b. The symmetric local context of the second disjunct q is $\neg p \cap C$.

Using this framework, we can explain the infelicity judgments observed earlier via the constraint in (15). The key insight is that if, when evaluating a constituent, the local context of that constituent already entails or contradicts it, the sentence becomes infelicitous.

(15) **Non-Triviality:** A sentence S is odd in a context C if any of S's constituents is either entailed or contradicted in its local context given C.

Absent other sources of oddness, this approach also agrees with the first approach in its predictions, since order, polarity, and connective type play no role here.

As with the Non-Redundancy approach, however, the Non-Triviality constraint can and, in fact, has been made sensitive to order. Specifically, the symmetric notion of local context defined above can be contrasted with an asymmetric version, in which the local context of a sentence constituent is computed only based on the material that linearly precedes it. The asymmetric local contexts for conjunction and disjunction are as follows:

(16) CONJUNCTION: $p \wedge q$ given a context C
   a. The asymmetric local context of the first conjunct p is C.
   b. The asymmetric local context of the second conjunct q is $p \cap C$.

(17) DISJUNCTION: $p \vee q$ given a context C
   a. The asymmetric local context of the first disjunct p is C.
   b. The asymmetric local context of the second disjunct q is $\neg p \cap C$.

In this version, the (a)-cases in (10) and (11) are predicted to be infelicitous, as in the symmetric version. In contrast, the (b)-cases are predicted to be felicitous, provided that the global context C neither entails nor contradicts the relevant constituent. Given the intuitive difference in order effects across connectives, the dilemma is therefore similar to the one we described for the other approach. Regardless of which version we take — symmetric or asymmetric — we encounter intuitive judgments that don't align with the predictions, though several of them also remain contested in the literature, underscoring once again the need for further empirical investigation.

2.3. The common predictions

The discussion above makes it clear that the two main approaches make the following predictions (**P1-P3** below) with respect to the three questions we started with. First, both theories have variants where there are order effects and variants where there are no order effects; across both options though, uniform order effects are predicted (**P1**). Second, both theories predict that the presence or absence of negation should not impact oddness judgments (**P2**). Finally, both theories predict that the choice of connective does not impact oddness judgments (**P3**).

These predictions were tested in two experiments. Experiment 1 focused on disjunctions and Experiment 2 on conjunctions. We now turn to a detailed description of these experiments.

3. Experiment 1: Disjunction

3.1. Participants

We recruited 199 participants from the Psychology subject pool at the University of Pennsylvania, who received class credit for their participation. All participants were undergraduate native English speakers.

3.2. Design

Experiment 1 examined the effects of order and polarity in Hurford disjunctions. The design included both positive and negative disjunctions, where one disjunct asymmetrically entails the other, with their order systematically varied. HD (Positive Hurford Disjunction) refers to standard cases without negation and NEGHD (Negative Hurford Disjunction) refers to cases where the disjunction contains negation. When the stronger disjunct appears first, the disjunction is labeled FIRST; when it comes second, it is labeled SECOND. All sentences were presented in contexts that ensured that the disjuncts were plausible, salient alternatives. Specifically, the contexts for NEG sentences were designed to enhance the naturalness of using negated disjuncts.

(18) *Positive Hurford Disjunction* (HD)
CONTEXT: John and his family want to visit Asia. They have various destinations in mind, but the most prominent ones are cities in Japan, especially Tokyo. Recently, John and his family returned from their Asia trip, so I thought:
a. Either John's family visited Tokyo or they visited Japan. (FIRST)
b. Either John's family visited Japan or they visited Tokyo. (SECOND)

(19) *Negative Hurford Disjunction* (NEGHD)
CONTEXT: John and his family want to visit Asia. They have various destinations in mind like some cities in Japan (especially Tokyo), as well as some cities in China. However, I have no idea if they could afford to go to all of these places. Recently, John and his family returned from their Asia trip. I noticed that they made no mention of Tokyo or Japan, so I thought:
a. Either John's family didn't visit Japan or they didn't visit Tokyo. (FIRST)
b. Either John's family didn't visit Tokyo or they didn't visit Japan. (SECOND)

To evaluate the three predictions outlined above, we aimed to assess the impact of entailment, the role of negation and the role of order. Concretely, how does the presence of an entailment relation between the two disjuncts influence the felicity of these sentences? Does the presence of negation modulate this effect? And does the order of the disjuncts influence the observed effect? Assessing these factors accurately requires appropriate baseline conditions for comparison. Thus, we included the following control conditions:

(20) *Positive Simple Disjunction* (SD)
CONTEXT: John and his family have been wanting to visit Asia for a long time. They considered various options, but in the end had to choose between going to Tokyo in the spring, or visiting some place in China for vacation in the summer. I have no idea what they ended up choosing, but given that the summer has ended now, I know that:
a. Either John's family visited Tokyo or they visited China. (FIRST)
b. Either John's family visited China or they visited Tokyo. (SECOND)

(21) *Negative Simple Disjunction* (NEGSD)
CONTEXT: John and his family have been wanting to visit Asia for a long time. They considered various options and initially thought about going both to Tokyo and to some places in China this summer. I have no idea if they had time to do either the Tokyo or the China option. However, I'm sure that they couldn't afford to go to both. So, even though I don't know where they traveled, I know that:
a. Either John's family didn't visit China or they didn't visit Tokyo. (FIRST)
b. Either John's family didn't visit Tokyo or they didn't visit China. (SECOND)

These baseline conditions eliminate the entailment relationship between the disjuncts. As a result, they allow us to determine whether any order-based or negation-based effects on the acceptability of disjunctions arise independently of entailment. For instance, suppose we observe a decrease in the acceptability of HD-FIRST compared to HD-SECOND. If this decrease exceeds the order effects observed in SD-FIRST versus SD-SECOND, we can conclude that the effect in the HD conditions is specifically linked to redundancy/triviality rather than general order effects found in standard disjunctions. The NEGSD controls play a similar role. First, they assess independent order effects in negated disjunctions, ensuring that any observed effects are not solely due to word order. Second, they evaluate the impact of negation, independent of whether an entailment relationship exists between the disjuncts. In sum, SD and NEGSD controls establish baselines against which we can measure any additional effects of redundancy or triviality in HD and NEGHD.

The stimuli outlined above represent our critical conditions. In total, 24 such items were created. Additionally, we included 24 fillers, which are omitted here for brevity.

3.3. Predictions

In the critical conditions, the design manipulates three key factors: [1] REDUNDANCY — whether a disjunction is Hurford (HD) or non-Hurford (SD); [2] POLARITY — whether the disjunction contains positive or negative disjuncts; and [3] ORDER — whether the stronger disjunct appears FIRST or SECOND in linear order.

Both the Non-Redundancy and Non-Triviality approaches predict that HD disjunctions should be less felicitous than their SD counterparts. As discussed, this holds regardless of polarity (i.e., prediction **P2**). Within our design, this means that switching from SD to HD (i.e., from non-redundant to redundant) should not be influenced by the polarity of the disjunction. In statistical terms, this predicts no interaction between the REDUNDANCY and POLARITY factors.

Turning to order effects, on a symmetric theory, the expectation is that (NEG)HD-FIRST and (NEG)HD-SECOND should not differ in acceptability, aside from any order-based effects already present in the corresponding (NEG)SD conditions (which are independent of redundancy). Statistically, this means that REDUNDANCY should not modulate any differences between FIRST and SECOND disjunctions, predicting no interaction between REDUNDANCY and ORDER.

However, under the asymmetric versions of the Non-Redundancy and Non-Triviality approaches, we instead predict order effects everywhere, i.e., across both conjunctions and disjunctions. In this case, disjunctions where the stronger disjunct comes SECOND should always be less acceptable than those where it comes FIRST. Crucially, since this is a specific effect of re-

dundant/trivial disjunctions, it should go beyond any general order effects observed in the non-redundant SD baselines. This leads to the expectation of an interaction between REDUNDANCY and ORDER.

3.4. Procedure

The REDUNDANCY factor was implemented as a between-subjects manipulation. As a result, the items were divided into two lists. List 1 included the four baseline conditions corresponding to the SD and NEGSD items presented in both orders. List 2 included the four target conditions corresponding to the HD and NEGHD items in both orders. Each list included 6 critical items per condition, hence 24 critical items, and 24 fillers, hence 48 items in total.

After providing informed consent, participants completed three training trials to familiarize themselves with the task. Each trial presented a context followed by a sentence. The sentences included: (1) a simple conjunction with no redundancy violation and no negation, (2) a conjunction where the first disjunct entailed the second (i.e., a redundancy violation), and (3) a simple conjunction with no redundancy violation but with negated conjuncts. Participants rated the naturalness of each sentence in context on a 7-point scale (1 = least natural, 7 = most natural) and received feedback on their responses. The experiment then began, with items presented in a randomized order within each group.

3.5. Data availability

All stimuli, together with the files and scripts required for the statistical analysis reported below, can be found on the *OSF* page for this paper, linked here.

3.6. Results

REDUNDANCY and POLARITY Figure 1 shows the distribution of the responses for the redundant and non-redundant disjunctions, aggregated across ORDER levels and grouped by POLARITY. Overall, responses for the positive and negative HD conditions were concentrated toward the lower end of the response scale, around 1-2. Responses for the SD baselines exhibited a different distribution pattern. For the positive cases (SD), responses clustered predominantly around 6-7, indicating high acceptability, whereas for the negative cases (NEGSD), responses were more evenly distributed across the scale, showing greater variability in judgments.

We fit an ordinal mixed-effects model (using a *logit* link function) to predict responses based on REDUNDANCY, POLARITY and their interaction. The REDUNDANCY and POLARITY factors were sum-coded. Our final model included random intercepts for both participants and items, a by-participant random slope for POLARITY and by-item random slopes for REDUNDANCY, POLARITY and their interaction.[2] The model revealed significant effects of POLARITY ($\beta = -0.25$, $SE = 0.06$, $z = -4$, $p < .001$) and REDUNDANCY ($\beta = -0.98$, $SE = 0.11$, $z = -8.6$, $p < .001$), as well as a significant interaction between them ($\beta = 0.37$, $SE = 0.06$, $z = 5.92$, $p < .001$). We used the `emmeans` package to conduct planned comparisons with Bonferonni-corrected p-values. This analysis revealed significant differences between SD and HD at both levels of the POLARITY factor (positive: $\beta = -2.72$, $SE = 0.25$, $z = -10.49$, $p < .0001$; negative: $\beta = -1.21$, $SE = 0.26$, $z = -4.65$, $p < .0001$). These results indicate

[2]The details of the model comparison for this and all subsequent models in this paper can be found on the *OSF* page for this paper, linked here.

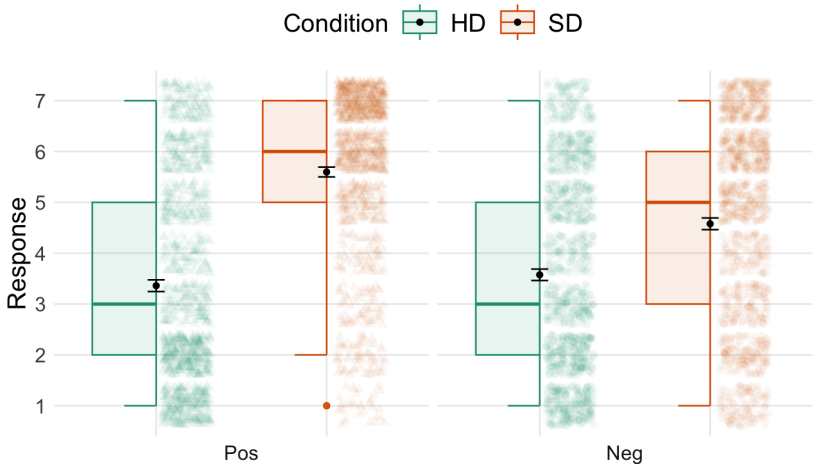

Figure 1: Responses to the HD and SD disjunctions (across ORDER levels) grouped by POLARITY. The data is visualized using a boxplot overlaid with a cloud of individual responses. Black dots represent the mean rating for each condition, with error bars indicating 95% confidence intervals.

that redundancy lowered acceptability for both positive and negative sentences. However, the effect was stronger for positive sentences, resulting in a significant interaction between REDUNDANCY and POLARITY.

REDUNDANCY and ORDER Figure 2 shows the distribution of the responses for the redundant and non-redundant disjunctions, aggregated across POLARITY levels and grouped by ORDER. Visually, the results indicated a clear effect of REDUNDANCY, with redundant (HD) disjunctions being rated significantly lower than their non-redundant (SD) counterparts, consistent with the previous interaction analysis. However, there was no indication that linear order of the disjuncts impacted responses.

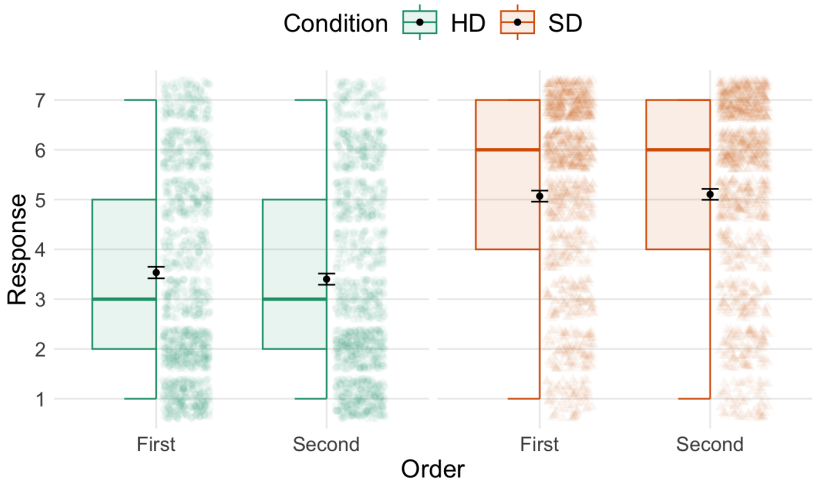

Figure 2: Responses to the HD and SD disjunctions (across POLARITY levels) grouped by ORDER. The data is visualized using a boxplot overlaid with a cloud of individual responses. Black dots represent the mean rating for each condition, with error bars indicating 95% confidence intervals.

To examine this further, we fit an ordinal mixed effects model similar to the one described

above. The final model included by-item and by-participant random intercepts, as well as a by-item random slope for the REDUNDANCY factor. The results showed a main effect of REDUNDANCY ($\beta = -0.91$, $SE = 0.1$, $z = -8.54$, $p < .001$), confirming that redundancy significantly reduces acceptability. Neither the effect of ORDER, nor the REDUNDANCY×ORDER interaction was significant (ORDER: $\beta = -0.02$, $SE = 0.02$, $z = -0.941$, $p = 0.34$; REDUNDANCY×ORDER : $\beta = -0.03$, $SE = 0.026$, $z = -1.3$, $p = 0.19$).

3.7. Discussion

Our results indicate that disjunctions with redundant disjuncts are indeed less felicitous than simple disjunctions: HD disjunctions, whether positive or negative, were rated significantly lower then the SD baselines. However, the magnitude of this difference varies by polarity: it is more pronounced for positive disjunctions than for negative disjunctions. This finding is incompatible with the prediction that there is no effect of negation, made by both the Non-Redundancy and Non-Triviality approaches. Regarding order, we found no significant effects. This suggests that, at least for disjunctions, there may be no order effect.

However, to gain a clearer understanding of the potential for order effects, we should compare disjunctions with conjunctions, as order-based contrasts are typically argued to manifest more intuitively in that comparison. In addition, we are not yet able to address the third question, **Q3**, concerning the strength of redundancy effects across connectives at this stage, as we have focused so far exclusively on disjunction. To fully evaluate the predictions regarding order and strength, we now turn to conjunction.

4. Experiment 2: Conjunction

4.1. Participants

A total of 201 participants were recruited from the University of Pennsylvania Psychology subject pool, 195 of whom had not participated in the previous experiment. All participants were undergraduate native English speakers.

4.2. Design

The design of this experiment mirrored that of Experiment 1 (see Section 3.2), with one key difference: no polarity manipulation was included. This decision was made to focus specifically on evaluating predictions regarding order and connectives, which did not necessitate the inclusion of negative conjunctions. Therefore, our critical stimuli consisted solely of positive redundant/trivial conjunctions that implemented a manipulation of order. We call these stimuli Hurford Conjunctions (HC), in parallel to the stimuli used in Experiment 1.

(22) *Hurford Conjunction* (HC)
CONTEXT: John and his family want to visit Asia. They have various destinations in mind, but the most prominent ones are cities in Japan, especially Tokyo. Recently, John and his family returned from their Asia trip, and had various souvenirs that I suspect they got in Tokyo (although I'm not entirely sure). So, I thought:
a. John's family visited Tokyo and they visited Japan. (FIRST)
b. John's family visited Japan and they visited Tokyo. (SECOND)

We also included baselines with no violation or redundancy/triviality, similar to Experiment 1.

(23) *Simple Conjunction* (SC)

CONTEXT: John and his family have been wanting to visit Asia for a long time. They recently came into a bit of money, and were talking about traveling to Tokyo and to China. They were also debating going to Australia, but not everyone was up for that. While I don't know what their final itinerary entailed, I suspect at least that:

a. John's family visited Tokyo and they visited China. (FIRST)
b. John's family visited China and they visited Tokyo. (SECOND)

The rest of the design was identical to that of Experiment 1 in all relevant respects. As before, a total of 24 critical items were created, along with 24 fillers, which are omitted here for brevity.

4.3. Predictions

In terms of order, both versions of the Non-Redundancy and Non-Triviality approaches predict uniform effects across connectives. In other words, if disjunction behaves symmetrically, so should conjunction, or else they're both asymmetric (recall **P1** in Section 2.3). This prediction holds, of course, modulo any order effects that connectives might exhibit independently of redundancy considerations. Statistically, this implies that the REDUNDANCY×ORDER interactions should be consistent across different connectives, meaning there should be no three-way CONNECTIVE×REDUNDANCY×ORDER interaction.

As discussed before, a similar pattern is expected for the strength of redundancy effects (recall **P3**). The difference between redundant and non-redundant conjunctions should mirror the corresponding difference observed for disjunctions. Consequently, no interaction between the CONNECTIVE and REDUNDANCY factors is expected.

4.4. Procedure

The procedure was the same as in Experiment 1 (see Section 3.4), except for the training phase, which excluded conjunctions.

4.5. Data availability

All stimuli, together with the files and scripts required for the statistical analysis reported below, can be found on the *OSF* page for this paper, linked here.

4.6. Results

Figure 3 shows the distribution of the responses for the redundant and non-redundant conjunctions by POLARITY. A visual comparison of Figure 3 (conjunction) and Figure 1 (disjunction) suggests differences in whether REDUNDANCY×ORDER interact. To assess this statistically, we fit a model predicting responses from CONNECTIVE, REDUNDANCY, ORDER and their interactions. The final model included random intercepts for participants and items, as well as by-item random slopes for CONNECTIVE, REDUNDANCY, ORDER and the CONNECTIVE×REDUNDANCY interaction. Additionally, a by-participant random slope for ORDER was included. The model revealed a significant three-way interaction ($\beta = 0.1$, $SE = 0.02$, $z = 4.97$, $p < .0001$). Planned comparisons using the `emmeans` package (Bonferroni-corrected p-values) indicated that this interaction was driven by an ORDER-based difference between conjunctions FIRST vs. SECOND ($\beta = -0.66$, $SE = 0.09$, $z = -7.23$, $p < .0001$), which was not observed for disjunction ($\beta = 0.11$, $SE = 0.08$, $z = 1.34$, $p = 0.17$).

The results also indicate that while both conjunctions and disjunctions exhibit REDUNDANCY

Figure 3: Responses to the HC and SC conjunctions by ORDER. The data is visualized using a boxplot overlaid with a cloud of individual responses. Black dots represent the mean rating for each condition, with error bars indicating 95% confidence intervals.

effects, the impact is significantly stronger for disjunctions. Figure 4 visualizes this contrast, plotting positive Hurford disjunctions against their SD baselines and comparing them to conjunctions (also plotted against their SC baselines).[3] To assess this statistically, we fit a model predicting responses from REDUNDANCY, CONNECTIVE and their interaction. The final model included random intercepts for participant and item, as well as by-item random slopes for REDUNDANCY, CONNECTIVE and their interaction. The analysis confirmed a significant REDUNDANCY×CONNECTIVE interaction ($\beta = -0.48$ $SE = 0.08$, $z = -5.49$, $p < 0.0001$). In short, redundancy lowered acceptability for both conjunctions and disjunctions, but the effect was much stronger for disjunctions ($\beta = 2.97$, $SE = 0.26$, $z = 11.39$, $p < .0001$) than for conjunctions ($\beta = 1.02$, $SE = 0.25$, $z = 3.95$, $p = 0.0001$).

5. General discussion

5.1. Main findings

The present results challenge the predictions made by the two main approaches to redundancy/triviality (Katzir and Singh, 2013; Schlenker, 2009), particularly with regard to the roles of order, negation, and connectives (as outlined in 2.3).

Firstly, we found that order matters, but only for conjunctions: conjunctions of the form $(p \wedge p^{+})$ were rated as more felicitous than their counterparts, $(p^{+} \wedge p)$. In contrast, for disjunctions, the order of the disjuncts did not impact their felicity; both forms were rated equally infelicitous. Secondly, negation was also found to play a role: positive disjunctions, $(p^{+} \vee p)$, were rated less felicitous than their negative counterparts, $(\neg p^{+} \vee \neg p)$, when compared to their corresponding baselines. Lastly, the type of connective involved also had an effect: redundancy lowered acceptability for both conjunctions and disjunctions, but the effect was much stronger

[3]Given the evidence from Experiment 1 that the acceptability of Hurford disjunctions is modulated by polarity, we subset the disjunction data to include only positive cases for this analysis. This approach allows for a more direct contrast with the conjunction data, as the conjunction stimuli did not involve any polarity manipulation. By focusing on positive disjunctions, we ensure that the comparison is as straightforward as possible, isolating the effect of redundancy/triviality while controlling for the potential influence of polarity.

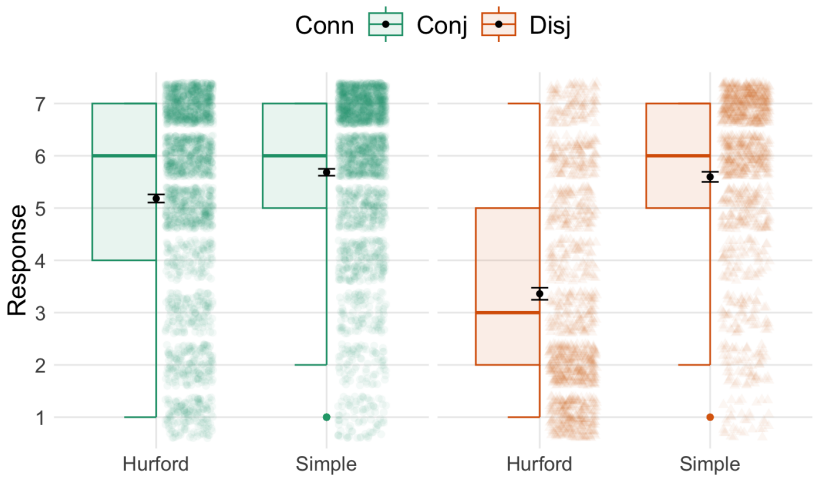

Figure 4: Responses to positive conjunction and disjunctions (across ORDER levels) grouped by REDUNDANCY. The data is visualized using a boxplot overlaid with a cloud of individual responses. Black dots represent the mean rating for each condition, with error bars indicating 95% confidence intervals.

for disjunctions. In sum, we see three main problems for the two theories we started with: First, we found an order effect for conjunction, but not disjunction. Second, we found an impact of polarity. And third, we found an impact of connective type. These three findings run counter to the two main approaches summarized above.

However, we do not believe these results invalidate the Non-Redundancy and Non-Triviality approaches altogether. Rather, we believe that a notion of redundancy or triviality remains necessary to explain our findings. Specifically, while negative Hurford disjunctions differ less from their non-redundant baselines, compared to their positive counterparts, they were still significantly less acceptable than these baselines. Similarly, both redundant/trivial conjunctions and disjunctions were rated less favorably than their respective baselines, with the difference lying in the intensity of the infelicity. Therefore, we suggest that the violation derived from Non-Redundancy and Non-Triviality theories can serve as a starting point for explaining these contrasts. However, we propose an additional theoretical component — *super-redundancy*, as introduced by Kalomoiros (2023a) — to capture the distinctions between positive and negative Hurford disjunctions, as well as between conjunctions and disjunctions. This modification will help refine these theories to better account for the nuances observed in our data. The issue of order will be addressed subsequently.

5.2. Introducing super-redundancy

The notion of super-redundancy builds upon the notion of redundant constituents. For the purposes of this discussion, we will adopt the definition of redundant constituent given in (7) (but see Kalomoiros (2023a) for a slightly different version).[4] A constituent is considered super-redundant if it is not only redundant but also irredeemably so — meaning any attempt to modify or strengthen any part of that constituent still results in redundancy. In more formal

[4]Basing super-redundancy on the redundancy definition given in (7) runs into some issues when attempting to extend it to *Hurford conditionals* (Mandelkern and Romoli, 2018). The actual definition provided in Kalomoiros (2023a) avoids these issues. But since this isn't relevant for the examples we consider here, we keep the current definitions for the purposes of this paper.

terms, the definition of a super-redundant constituent is as follows:

(24) **Super-redundant constituent:** Given a sentence S, a context C, and a constituent E embedded in S, E is super-redundant in C iff (i) E is redundant in S in C and (ii) for all constituents E' of E, and for all D: $E[E'|E' \wedge D]$ is redundant in S in C, where $E[E'|E' \wedge D]$ is identical to E except that E' has been replaced with $(E' \wedge D)$.

Along with the definition above, we introduce the following constraint:

(25) **Non-Super-Redundancy:** A sentence S is odd in a context C if it contains any super-redundant constituents.

The idea is that violations of both **Non-Redundancy** and **Non-Super-Redundancy** can intensify the infelicity of a sentence. In particular, the failure to obey **Non-Super-Redundancy** can lead to greater perceived oddity or unacceptability.

Let us now explain how the notion of super-redundancy can help account for two key aspects of our results: why negation plays a role and why the choice of connective matters. First, we begin with positive Hurford disjunctions and demonstrate that they are both redundant and super-redundant. Recall that disjunctions of the form $(p^+ \vee p)$ and $(p \vee p^+)$ are both equivalent to p, which means that p^+ is a redundant constituent in these constructions. Moreover, p^+ is super-redundant in this case, as no matter what we attempt to conjoin it with, its redundancy cannot be eliminated, (26).[5] Since p^+ is both redundant and super-redundant, $(p^+ \vee p)$ and $(p \vee p^+)$ violate both **Non-Redundancy** and **Non-Super-Redundancy**.

(26) For all D, $((p^+ \wedge D) \vee p) \equiv (p \vee (p^+ \wedge D)) \equiv p$

On the other hand, redundant conjunctions and negative Hurford disjunctions only violate **Non-Redundancy**, which explains why they are less infelicitous than positive Hurford disjunctions. Let's first consider conjunctions: $(p^+ \wedge p)$ and $(p \wedge p^+)$ are both equivalent to p^+, meaning that p is redundant in these constructions. However, in this case, p is not super-redundant since there are ways to strengthen it to eliminate redundancy. For example, consider (27), where we select $D = \bot$:

(27) For $D = \bot$, $(p^+ \wedge (p \wedge D)) \equiv ((p \wedge D) \wedge p^+) \equiv \bot$, and hence $\not\equiv p^+$.

The same reasoning applies to negated Hurford disjunctions. While $\neg p$ is redundant in both $(\neg p^+ \vee \neg p)$ and $(\neg p \vee \neg p^+)$, as both are equivalent to $\neg p^+$, it is not super-redundant. We can select a D to conjoin with one of its sub-constituents, in a way that eliminates the redundancy of $\neg p$ and makes it non-redundant.

(28) For $D = \bot$, $(\neg p^+ \vee \neg (p \wedge D)) \equiv (\neg p^+ \vee \neg \bot) \equiv \top$, and hence $\not\equiv \neg p^+$.

In sum, p isn't super-redundant in $(p^+ \wedge p)$ or $(p \wedge p^+)$, and neither is $\neg p$ in $(\neg p^+ \vee \neg p)$ or $(\neg p \vee \neg p^+)$. As a result, these sentences only violate **Non-Redundancy**, unlike the positive Hurford disjunctions, which violate both **Non-Redundancy** and **Non-Super-Redundancy**. This distinction allows us to explain why the positive Hurford disjunctions are judged as more infelicitous, which aligns with our experimental findings.

[5] If p is true, then $((p^+ \wedge D) \vee p)$ is true. If $((p^+ \wedge D) \vee p)$ is true, then either p is true or $(p^+ \wedge D)$ is true, hence p is true (since $p^+ \models p$). Since we have made no assumptions about D, this equivalence holds for all D.

5.3. The question of order and its relation to presupposition

As previously discussed, the notion of super-redundancy accounts for two key aspects of our results: it provides an explanation for the differences between positive and negative Hurford disjunctions, as well as for the distinction between disjunctions and conjunctions. In other words, it helps explain why negation and the type of connective involved matter. However, super-redundancy does not help to explain effects of order. If a constituent is super-redundant, it remains so regardless of its position in the sentence, meaning that super-redundancy does not offer an explanation for the order-based contrasts observed in our results.

While we are not able to provide a full account of this aspect of our findings here, we suggest that for a better understanding of order in theories of redundancy/triviality, we should relate these more closely to recent developments in theories of presupposition filtering. Presupposition has, of course, commonly been seen as closely related to redundancy/triviality phenomena, in that it intuitively refers to background information that is taken for granted or assumed to be common knowledge, hence contextually redundant. Importantly, parallel order effects to those above have been observed for presupposition. It has long been argued, since at least Karttunen (1974), that presupposition filtering is sensitive to order in conjunctions, but not in disjunctions. For example, consider the following:

(29) a. John used to smoke Marlboros and he stopped.
b. John stopped smoking and he used to smoke Marlboros.

While (29a) is not felt to presuppose that John used to smoke, (29b) is interpreted as presupposing this, a conclusion experimentally confirmed by Mandelkern et al. (2020).[6] On the other hand, in disjunctions like the ones below, no presupposition is felt to be present (see Kalomoiros and Schwarz 2024 for recent experimental confirmation):[7]

(30) a. Either John didn't use to smoke or he stopped.
b. Either John stopped smoking or he didn't use to smoke.

Note that, just like the cases of redundancy/triviality we examined in the introduction, presupposition cannot be fully captured by making reference to a fully global constraint requiring the context to entail the relevant presupposition. As the examples in (30) suggest, it is possible for a sub-constituent to carry a presupposition, without the overall sentence itself requiring a context where the presupposition is common ground; in fact, the sentences in (30) would not be usable in a context where the presupposition that *John used to smoke* was known to be true (cf. Hirsch and Hackl 2014).

As such, similarly to what we proposed for redundancy and triviality, theories of presupposition filtering commonly take more localized context computations to be a crucial ingredient. A promising insight from the triviality approach is that the same local contexts can be used for triviality and presupposition: in this view, presuppositions must be entailed by their local con-

[6]When taking cases where one conjunct is equivalent to the presupposition of the other (e.g., *John used to smoke and he stopped*), one might be tempted to attribute the order effects to redundancy/triviality. Adding 'Marlboros' to make the relevant relation one of asymmetric entailment controls for this potential confound. The results in Mandelkern et al. (2020) indicate that, even with this adjustment, the contrast persists.

[7]One issue that must be controlled for when reasoning about symmetric filtering with disjunctions is the possibility that symmetry arises from local accommodation (Schlenker, 2008; Hirsch and Hackl, 2014). The experiments we reference include explicit controls to rule out this potential confound (see Kalomoiros and Schwarz 2024).

text (contrasting with the ban against entailment and contradiction for at-issue content, that, as we saw, was the key ingredient on the local triviality approach for accounting for redundancy phenomena).[8] If a local-contexts-based theory can account for these effects, it would predict that both redundancy and presupposition phenomena are sensitive to order manipulations in the same way, as we have argued here (see also Schlenker 2009).

While the theory of local contexts in Schlenker (2009) fails to derive differential order effects for conjunctions vs. disjunctions, more recent work, such as the *Limited Symmetry* approach (Kalomoiros, 2023b; Kalomoiros and Schwarz, 2024), has successfully accounted for varying order effects for presupposition in conjunctions and disjunctions. This approach, inspired by the Transparency theory (Schlenker, 2007; Schlenker, 2008), could potentially be adapted to capture the order effects in redundancy/triviality phenomena as well. The key question for future research is whether this approach can be reformulated in a way that retains its asymmetries between conjunctions and disjunctions while being based on local contexts. Moreover, incorporating a notion of super-redundancy into this theory would also be essential to account for the effects of negation and connective type (the notion of super-redundancy presented here stayed within a Katzir & Singh-style redundancy approach).

6. Conclusion

We have presented two experiments that challenge some core predictions of the two main approaches to redundancy/triviality phenomena (Katzir and Singh, 2013; Schlenker, 2009). Contrary to these predictions, our results indicate that polarity, order, and the identity of the connective all influence the observed patterns of infelicity. We suggested that the effects of polarity and connective can be captured by appealing to the notion of *super-redundancy* (Kalomoiros, 2023a). While we were unable to offer a definitive solution for the effects of order, we argued that such a solution may arise when we achieve a tighter integration between two types of constraints: those regulating at-issue contents (which have been the focus of this paper) and those regulating presupposition.

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[8]For example, if in (30a)-(30b) we take the local context of *John stopped smoking* to be the negation of *he didn't use to smoke* (i.e. *John used to smoke*), we predict that these sentences overall do not presuppose that *John used to smoke*; the presupposition is entailed by its local context and hence is *filtered* (cf. Karttunen (1973, 1974); Schlenker (2009); Kalomoiros and Schwarz (2024) a.o.)

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