

Space, Time, and Polarity*

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— For Háj Ross

Of the three topics especially mentioned in the call for papers for this conference (“cognitive linguistics, conceptual metaphor, and linguistic analysis of literature”), we propose to treat the first two in this paper. But, in deference to the third topic, we begin with some remarks on the analysis of literature in the broad sense, as encompassing what is sometimes called “The Linguistics Literature.”

Polarity sensitivity, which is the topic of our paper, has long been a troublesome problem in linguistics. Proponents of every successive theory of grammar and meaning for the last 40 years (and there have been a lot of them) have taken a crack at accounting for the phenomenon in their own terms, as a test for their particular brand of grammatical or semantic prowess. While there is broad agreement on what polarity encompasses, there is very little on exactly what it is, or on why or how it works. Good summaries of the history of the literature, from several perspectives, are available in Horn (1996) and Israel (1996).

All of these treatments, like all of the theories behind them, utilize conceptual metaphors. This is to be expected of any intellectual account, of course; we humans really have no choice in the matter. The metaphors that have been used in these accounts, and the theories they have informed, have often been considered mutually incompatible. We think this is a mistake. From a cognitive perspective [note the visual metaphor, which we return to below], most phenomena in natural language overlap theoretical bounds, and satisfying explanations are usually to be found, if at all, in the interaction of several more or less independently-motivated linguistic facts or processes – and in the interaction of the metaphors they evoke. But different metaphors can be coherent with one another, and often are; therein lies much of their power.

In this paper, we use several distinct but coherent metaphoric systems in analyzing the details of some negative polarity items in English. One is the cognitive topological concept of *mental spaces* (Fauconnier 1985). Another is the lexical semantic feature system of Israel 1996. Along the way we will refer to the syntactic structural concept of *negative triggering* (Horn 1996). We put them together using the coherent visual, spatial, cognitive concept of *focus*.

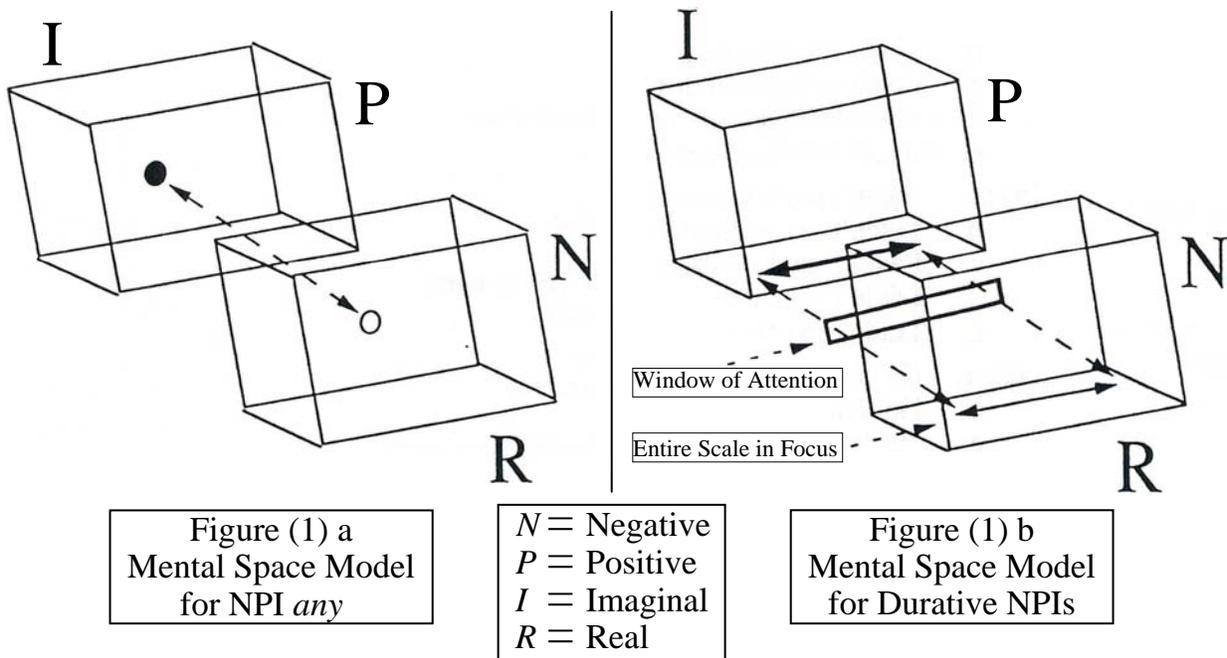
The kind of data we’re interested in here is exemplified in (1), with particular attention to the durative temporal NPIs *yet*, *until* (with punctual predicates), *in weeks* (*months*, *years*, *a coon’s age*, *donkey’s years*, etc.), *any more*, and *take/last/be long*.

- (1) a He’s the first/*last guest to arrive *yet*.
b He’s the *first/last guest to arrive *until noon*.
c I don’t like/*dislike the way it sounds *any more*.
d I didn’t think (*she said) he’d been here *in weeks*.
e *I’m surprised it takes long.

* Or, *Negs in Space!*

The mental spaces model of polarity was originally proposed by van Hoek (1996) in accounting for NPI *any*. As it happens, this more geometric model turns out to be quite coherent with the more algebraic lexical semantic model proposed by Michael Israel (1996), and this nice fit allows one to switch between them, and use whichever is more convenient to explicate various phenomena, just as geometry and algebra cohere mathematically (and, we suspect, for much the same reasons).

Our first assumption, one made also by Fauconnier (1985) and Langacker (1991), is that any kind of negative construction (including negative polarity) requires setting up an imaginal mental space which contains what we could think of as a positive version of the conception that's negated. That is, for a sentence like *Dan didn't know any foreign languages*, the negative element *didn't*, in combination with the other elements in the clause, sets up a mental space distinct from conceived reality, which includes a conception of Dan knowing some foreign language(s); that conception is then compared with the conception of the actual state of affairs, in which Dan's knowing foreign languages is absent.



In the diagrams above we have two mental spaces, **R** (*Real*) and **I** (*Imaginal*), and here the *Negative* space, which lacks the criterial element that is present in the *Positive* space) is *Real*, while the *Positive* space is *Imaginal*). In equational terms: $P = I$, and $N = R$.

The NPI *any* introduces an arbitrary instance of a nominal type into the P-space, where it serves just to characterize the relation that's negated. It's missing in the N-space; there's a gap where *any* should be. In van Hoek (1996), the question considered was why certain constructions involve *Neg-Transparency* [we return below to the visual metaphor implied by this term] for negation or remote licensing of *any*, as in (2) and (3).

- (2) a I didn't imply that anything was going to happen.
 b *I didn't shout that anything was going to happen.

These data are analyzed in terms of the principle that it must be the Focus Space into which the NPI *any* introduces its random/arbitrary nominal instance. That is, the P/N compari-

son must be the space being attended to. There are, to no one's surprise, limits on human attention, and the most usual limit is one mental space, which can be thought of as the most *accessible* space (using one type of cognitive model), or as the *activated* space (using a different one). We simply call it the *Focus Space* (using still another). This is not, by the way, an arbitrary limit, but rather one based firmly on human perception.

Negation appears to push the attentional envelope a bit, using not just one but two spaces; but this is tractable cognitively as long as we can maintain our attention on it, since the two spaces are effectively identical, except for the special focus on the negated element. When other aspects of sentence understanding require us to shift our attention, however, anomalies can occur with negation; these are ultimately what is responsible, we would argue, for much of what Israel (1996:619) calls the “glorious messiness” of Polarity Sensitivity.

- (3) a John didn't know I knew any of these languages.
 b *John didn't know I know any of these languages.

In (3a), the embedded clause describes something which occurs in reality, but it is construed primarily as part of a description of the overall negated conception – that John didn't know, etc. NPI *any* is acceptable in (3a) because it is included in a P/N comparison.

In (3b), however, the difference in tense between the main and embedded clauses signals a subtle shift in focus from past to present, so that the embedded clause is not construed primarily as a description of what-John-didn't-know (though it is that as well), but rather is primarily a description of reality, and only secondarily a part of a larger negated conception. The P/N comparison is therefore backgrounded, not in focus, and NPI *any* is ruled out – because it would be introducing an arbitrary instance into the conception of reality, rather than the negated conception.

So long as the P/N comparison is the Focus Space, NPI *any* is OK. If it ceases to be the Focus Space, NPI *any* is impossible, even if there is still a P/N comparison space as a backgrounded part of the meaning of the construction. The same analysis applies to the pair in (2), but here the distinction is that the verb in (2a) forces attention entirely to the contents of the embedded clause, bringing the P/N comparison into focus, while the verb in (2b) splits the attention between the embedded clause and the conception of the overall discourse event, i.e. the manner in which the embedded clause was said, etc.

Van Hoek (1996)'s basic claim about *any* is this:

The mental space set up by negation must continue to be the space that currently contains the focus of attention (and that is understood to be the space within which new material is contextualized), up to and including the point in processing at which the conceptualizer has to assign some construal to the word *any*.

This comprises two principles:

- (i) The negative element in the sentence must be sufficiently prominent cognitively (i.e. topical) to set up the negation space.
- (ii) The negation space must be the Focus Space, up to and including the chunk containing *any*. (Attention shifts make it impossible to use NPI *any*.)

Before turning our attention to the data involving durational temporal modifier NPIs, we should take a moment to [literally] flesh out the metaphoric model we have been using above. As noted, it is a visual metaphor, based on human spatial perception. Mental Space theory deals

with cognitive linguistic phenomena in terms of a spatial metaphor, and humans conceive of space in terms dictated largely by their binocular visual system, which has some properties that map very nicely into linguistic cognition.

For one thing, vision is directional, so that physical movement of the eyes (or even the head, for shifts of a more gross nature) is required in order to attend to things located in different places. We use this as a natural metaphoric map for human cognitive *attention*, as when we speak of “turning our attention” to something else; in this model, our analog is the mental *Focus Space*. There can only be one mental space that attention is directed to, in which something can be “focussed on”. Other spaces can be perceived “peripherally”, or “in the background”, but one cannot “focus” on any item in them. To do so, one must “turn one’s attention” to them, and by default, “turn one’s attention” away from other spaces.

For another thing, optical image formation crucially involves a focal plane; that is, even when our eyes are pointed in some direction, not all of the visual field is clear. Some part of it will be “in focus”, and our (largely unconscious) control of the eyes will naturally “bring into focus” that part of the visual field that is being attended to.

In tabular form, the metaphoric model sorts out like this:

	<i>Muscular</i>	<i>Visual</i>	<i>Cognitive</i>	<i>Linguistic</i>
1)	gaze direction	visual field	“attention”	“Focus Space”
2)	ocular focus	focal plane	“focus”	item “in focus”

Mappings in the Mental Space Model

Figure (2)

We use this two-step process here to model processing of sentences containing NPIs, though it is in principle widely applicable elsewhere. In particular, we introduce here the term *Window of Attention* as an analog of the dimensions of the focal plane. That is, if the item in focus is cognitively large, in the sense of occupying a large portion of the analog of the visual field, or Focus Space, then we speak of its having a large “window of attention”. These are relative judgements, of course; but clearly any window that can encompass the whole of one entire dimension of a space must be relatively large, and this fact becomes important in dealing with the durational NPIs, as mapped under the TIME IS SPACE conceptual metaphor theme.

We have seen what it means to say that NPI *any* must appear within the Focus Space set up by negation. We now turn our attention (having seen what **that** means) to how this account coheres with the analysis presented by Michael Israel’s seminal paper “Polarity Sensitivity as Lexical Semantics” (1996). Israel (who treats both Positive and Negative Polarity under the rubric of “Polarity Sensitivity”) points out that there are two criterial features in all polarity phenomena:

“..polarity sensitivity arises from the interaction of two binary lexical semantic features: (**Quantitative**) *q-value*, which can be either high or low, and (**Informative**) *i-value*, which can be either emphatic or understating. Quantitative value simply refers to an element’s position within a scalar ordering and reflects the well-known fact that a sizable portion of [Polarity-Sensitive Items] encode some notion of amount or degree. The notion of informative value (cf. Kay, 1990) reflects the fact that in context and with respect to background expectations some propositions are more informative than others: moreover, in characterizing any given situation, a speaker may exploit this fact to present her contribution either as strongly informative and emphatic, or as weakly informative and understating.” (pp.624-5; emphasis added)

Israel is very clear about the significance of **scalarity** here; this is a very important insight, and we concur heartily. In our model, the fact that the Focus Space is scalar (i.e., that it is defined in terms of a dimensional scale, typically a temporal dimension in the case of durational NPIs) turns out to be criterial.

The basic insight that emerges in our model, then, can be summed up in a few facts.

First, two known facts about temporal expressions:

- a) Durational expressions of any sort require a **temporal scale** in their Focus Space. This is an uncontroversial and very general observation.
- b) Durational expressions that are NPIs refer to an **empty** temporal scalar space. This observation has been made many times before in the literature, perhaps most commonly in explaining the semantics of *until* with punctual predicates. That is, if *he didn't arrive until noon*, then the salient part of the temporal scalar space prior to the point labelled *noon* is consistently empty of instances of *his arrival*, which defines a consistent duration, and this in turn licenses the use of *until*, which requires a durational temporal scale, and would otherwise be incompatible with the punctual (non-durative) predicate *arrive*. This is part of what (we believe) is meant by Israel's **q-value**.

Second, two known facts about negation in cognitive grammar:

- c) In a cognitive model, negation is a matter of **dual Focus Space comparison**; i.e., the Focus Space must be the P/N comparison. (refer to Figure 1)
- d) The corresponding chunks of the dual Focus Space in negation must be **in focus** in order to compare them. That is, the Window of Attention must encompass the imaginal positive and its relation to the other elements of the space in order to make sense of any negation.

So far we are in familiar territory. The conclusions from these, however, are interesting:

- e) In the case of a **scalar** dual Focus Space, in which one must attend to and focus on an **empty** scalar space, the Window of Attention (which defines the items in focus) must encompass the **entire** scale in question in order to establish its emptiness in the real space. This is the analog to Israel's **i-value**, which refers to the dimension of the Window of Attention, either emphasizing its entirety, or entailing it by minimal understatement.
- f) Therefore, any process that has the effect of diminishing the Window of Attention, either by diverting attention to another mental space, or by focussing on other elements than the empty scalar space, will result in anomaly with durative NPIs.

Our fundamental notion is that some of the special constraints on NPIs – particularly the fact that some of them are much fussier or more “neg-needy” than NPI *any* – arise from their requiring a larger Window of Attention, a.k.a. greater focus in the space set up by negation which must also be the space that includes the NPIs. This leads to subtle differences in their behavior which cannot be predicted or explained by any gross structural differences in the syntactic contexts in which they occur; nor can it be captured by simply positing that certain verbs or predicates are NPI-licensors and will therefore license any sort of NPI. Rather we find that different verbs vary subtly in their ability to set up an environment which can sanction the use of a particular NPI. We analyze the distinctions among these verbs in terms of the distribution of attention.

As Ross pointed out a quarter-century ago in “Negginess”, NPIs may be ranked in an implicational hierarchy, from smallest Window of Attention (i.e. least neg-neediness) to greatest:

any > *any more* > *long* > *yet* > *until* = *in weeks*

Implicational Hierarchy of Durative NPIs

Figure (3)

This ordering is easily explained in terms of the semantics of the individual items:

- **Any** merely introduces an arbitrary instance of a nominal type into the focus space.
- **Any more** implicitly contrasts present with past time; it focuses on a slice of time which encompasses the present, which is understood to be the time-span within which some state of affairs does not hold true (though it is implied that there is some earlier time, not specified, at which it did); in other words, it specifies that the P/N comparison holds in the present time and has held for some unspecified amount of time, although there is an implication that $P = R$ at some time in the past. Its focus however is on the present time. In the so-called “positive *any more*” lects (i.e. those in which both (4a) and (4b) are acceptable), the P/N comparison is generalized as an α / $-\alpha$ comparison, where α can be either P or N; the semantic structure is otherwise identical.
 - (4) a I don’t buy my groceries at Bergdorf’s any more.
 - b %I buy my groceries at Bergdorf’s any more.
- **Long** is used in negative constructions (e.g. “It didn’t take long”) to introduce the conception of a span of time in the P/N comparison. What is negated in a construction like this is precisely the notion of the span of time – e.g. to say “He didn’t live there long” is not to say that he didn’t live there, and to say “That didn’t last long” is not to say that it didn’t last for any duration at all. So the focus in such a construction is precisely on the duration of the event; the P space includes the conception of a long duration, which is absent in the N space, and $N = R$. *Long* therefore requires a fairly large Window of Attention in order to encompass this rather specific temporal notion. To put it another way, what is negated is not the entire process conception, but a specific detail – a lengthy duration. This detailed comparison requires a greater focus on the P/N comparison than is required when what is being negated is an entire process conception (as in “He didn’t know anyone”).
- **Yet** contrasts P/N in the present time, but also includes an implicit expectation that that which is absent from N in the present time will eventually be realized in the future. There are two time points, the present time (at which the P/N comparison holds and $N = R$), and the future time when the expectation is that the situation described in P will hold in R. There is therefore a three-way comparison between N, P and an expectational space. This requires still greater allocation of attentional resources to accommodate the complex comparison.
- **Until**, when occurring with punctual predicates, is similar to *yet*, but has the added burden of specifying a particular time (often by means of an entire embedded clause which describes some benchmark event, as in “He won’t come back until Hell freezes

over”).

It therefore requires an even greater commitment of attentional resources than *yet*.

- *In weeks*, and others like it (*in years, in a month of Sundays, in a coon’s age*, etc.) are tied with *until* for the status of most neg-needy. *In weeks* is similar to *long* in describing a duration, but it describes it more specifically. It is also similar to *yet* in using the present time as a reference point from which to calculate this duration (which may be literal, or metaphoric like *in a month of Sundays*). Like *until*, it therefore requires a significant focus on the negative space containing it.

The mental spaces model thus provides a way of talking about what Israel calls *the sensitivity problem*, i.e, what makes certain NPIs more or less sensitive to various types of negative contexts. The nature of these contexts themselves he calls *the licensing problem*, and this, too, can be usefully discussed in this model. Predicates that can trigger NPIs, for instance, fall into a number of classes, and their licensing behavior (their so-called “negative strength”) with regard to the implicational hierarchy explicated above is also amenable to explanation from this viewpoint.

We begin with the transparent verbs of cognition, which focus completely on the object of conceptualization. [We call attention, parenthetically, to the naturalness of the vision metaphor *transparent* in this context; other semantic uses of the term, like Quine’s *referential transparency* and *opacity*, are further evidence of a common folk theory of mental spaces.] Verbs such as *think* and *doubt* (and also *expect*, *believe*, and *imagine*) set up a focus space which contains **only** the conception described by the complement clause, rather than drawing attention to the act of *thinking* or *doubting* itself. *Not think* therefore licenses **any** sort of negative polarity item, and *doubt* works similarly:

- (5) a. I don’t think he lives there anymore.
 b. I don’t think it’ll take long.
 c. I don’t think he’s gotten there yet.
 d. I don’t think he’ll get here until hell freezes over.
 e. I don’t think he’s been here in weeks.
- (6) a. I doubt he lives there anymore.
 b. I doubt it’ll take long.
 c. I doubt he’s gotten there yet.
 d. I doubt he’ll get here until hell freezes over.
 e. I doubt he’s been here in weeks.

Verbs of saying, however, unlike the transparent cognitive predicates, require a partial focus on the reported discourse event. Verbs like *say* and its negative *deny* are transparent enough for NPI *any*, and for some other NPIs, but they split the conceptualizer’s attention between the conception described by the embedded clause and the conception of the reported speech event itself. In effect, they distract some attention, and therefore do not open a large enough window to accommodate all NPIs, particularly those which describe a durational space with an attendant scale, and its necessity for a large window.

- (7) a. I didn't say it'd take long.
 b. I didn't say he lived there anymore.
 c. ?I didn't say he's there yet.
 d. *I didn't say he'd arrive until hell freezes over.
 e. *I didn't say he's been there in weeks.
- (8) a. He denied that it would take long.
 b. He denied that he lived there anymore.
 c. He denied that it was there yet.
 d. *He denied it'd arrive until hell froze/freezes over.
 e. *He denied that he'd been there in weeks.

(There is another construction, “He denied being there in weeks,” which may be better – note that this does not involve a full grounded finite clause as complement, and so there may be closer conceptual connections between the gerundial clause and the matrix clause.)

Another class of verbs which divides attention between two mental spaces includes verbs such as *be surprised (that)* and *(not) know (that)*. Both are factive, of course, and early discussions of their behavior as negative triggers pointed to their presuppositional “content”. It is not necessary to resort to this, however, in a mental space model, since presuppositions are simply another mental space. Each of these verbs, for instance, takes a complement clause which describes a situation which obtains in reality – space **R**. **R** is compared with **I**, which corresponds to either the person's background assumptions (in the case of *be surprised*) or the person's state of awareness (in the case of *not know*).

- (9) a. I was surprised he lived there anymore.
 b. *I was surprised it took long.
 c. *I was surprised he was there yet.
 d. *I was surprised he arrived until hell froze/freezes over.
 e. *I was surprised he'd been there in weeks.
- (10) a. I didn't know he lived there anymore.
 b. *I didn't know it would take long.
 c. ?I didn't know it was there yet.
 d. *I didn't know he'd arrived until hell froze/freezes over.
 e. *I didn't know he'd been there in weeks.

Indeed, we find that these predicate classes form another implicational hierarchy of negative contexts, similar to, but orthogonal with, the hierarchy of durational NPIs:

<i>doubt</i> > <i>deny</i> > <i>surprised</i> = (<i>not</i>) <i>know</i>
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Implicational Hierarchy of Negative Predicates

Figure (4)

The cross-product of the two orthogonal hierarchies (which participate, respectively, in *the sensitivity problem* and *the licensing problem*) is what results in the “Negative Polarity Squish” first presented in Ross (1971), perhaps the best overall account of just how gloriously messy NPIs actually are.

The observations we have offered here, and the model we offer them in, do not of course account for **all** of the details of **all** of the judgements in the examples; on the other hand, there is

no reason to believe that any single observation or model, no matter how relevant, **should** be expected to do that. Israel (1996) calls this *the diversity problem*, and points out that, as with all lexical phenomena, fine-structure details are determined in the last analysis by the individual details of the lexical items and their meanings, and can be expected to vary considerably, and largely unpredictably. One might as well expect to predict the precise syntactic behavior of the direct objects of all verbs from an account of transitivity; but one would be very disappointed in that expectation. In principle, the finer the lexical grain, the more idiosyncratic the observed syntax.

As the last scheduled attraction in this scouting expedition in N-space, we now direct your attention to one final NPI phenomenon: *secondary triggering*, mentioned most recently in Horn (1996).

Secondary triggering [note the physical, even mechanical, syntactic nature of the metaphor here; we return to this below] is the term, due to Horn, Lawler, and Neubauer, in informal work from 1971, given to situations in which NPIs that would ordinarily not be licensed in a particular context are acceptable despite this, just provided that another, less neg-needy, NPI occurs in the context as well. For example, in (11)a, the NPI *in weeks*, which is low on the hierarchy, predictably fails to be licensed by the affective predicate *surprised*, which is also low on its hierarchy. But in (11)b, the licensing of the high-scalar NPI *anybody* by *surprised* results also, against prediction, in licensing of the low-scalar *in weeks*.

- (11) a. *I'm surprised he's been here in weeks.
 b. I'm surprised anybody's been here in weeks.

The intuitive model we were using in 1971 was that the *negative trigger* (typically associated with a particular lexical item, in this case *surprised*) exerted some *force* (typically conceptualized as a field of some sort; the magnetic field was probably the most natural model of action-at-a-distance) on the NPI. This was handy in that it allowed for variable field strength analogs in the case of weak triggers and neg-needy NPIs; secondary triggering, however, put a strain on the model. Without a good analog of Maxwell's equations, we were not ready to take on paramagnetism. Any more, we would describe the phenomenon in terms of mental spaces.

The difference between (11)a and b in our model lies in the added attention provided by the NPI *anybody* in (11)b, which establishes the P/N comparison as the Focus Space there; in (11)a, it is not the Focus Space, since attention is split between that space and the expectational space set up by *surprised*. Once this space is fixed as the Focus Space by the occurrence of the arbitrary human referent of *anybody*, the Window of Attention in the P/N comparison space can accommodate the comparison with the scale implied by *in weeks*. Note that the comparison is logically less demanding in (11)b, since what is being contrasted is not a span of time with no occurrences of *his being here* (since *he* is completely referential), but rather a cognitively much simpler span that is empty of **all** human presence (since *anybody* is arbitrary). No referential space need be set up for *he*, and the comparison proceeds without problem.

It will always be the case, we predict, that examples of secondary triggering will **augment** the Window of Attention, by forcing the P/N comparison space as the Focus Space, and **reduce** the specificity of the P/N scale comparison itself, by introducing arbitrary reference. Unexpected licensings in these cases will be the result of a fit between the reduced scale and the augmented Window, though as usual there is no guarantee that **all** such cognitive resizings will result in a good fit.