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Cognitive operations and projection spaces[1]

In recent years, Mark Turner and Gilles Fauconnier have popularized the theory of blending (or conceptual integration) as a widespread cognitive mechanism which applies over many areas of conceptualization, including metaphor and metonymy. According to this theory, the understanding of some metaphorical expressions involves the activation of, at least, four different mental spaces: two input spaces (i.e. a source and a target space), a generic space, and a blend. Turner & Fauconnier contend that in this process emergent structure may be created which is not present in any of the input spaces. Emergent structure is the result of a number of potential irregularities in the mapping process, such as the existence of asymmetries and non-correspondences between source and target. The present paper examines Turner & Fauconnier's proposal carefully and argues that there are no irregularities in conceptual projection. In our view, purported irregularities are only apparent and may be explained away in terms of the activation and principled combination of partial source and target inputs which are projected and integrated into single composite source and target spaces. These composite spaces have all the structure necessary for the metaphorical cross-domain mapping to take place in such a way that there are no non-correspondences or asymmetries between source and target. We also

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argue that the default interpretation of expressions involving conceptual projection and integration is a matter of the activity of any of a number of cognitive operations such as correlation, contrast, domain expansion, domain reduction, strengthening, mitigation, saturation, and counterfactual reasoning. Finally, in our alternative account, there is a projection space that is constructed on the basis of the conceptual structure resulting from such operations. This space is available for additional implicative operations that are often needed to derive the ultimate value of expressions in context.

Key words: mental space, blend, emergent structure, input space, conceptual projection, integration, cognitive operations, projection space

0. Introduction

The question of conceptual interaction has been a relatively important area of interest in cognitive linguistics, especially in work carried out by Mark Turner and Gilles Fauconnier in relation to mental space theory and the notion of blending or conceptual integration (cf. Fauconnier & Turner, 1996, 1998, 2002; Turner & Fauconnier, 1995, 2000). However, some relevant aspects of mental space theory have been convincingly challenged in Ruiz de Mendoza (1996, 1998), in particular those connected with the apparent irregularities and asymmetries found in blended mental spaces. In this connection, we propose an alternative account that explains such irregularities and idiosyncrasies in terms of the activation and principled combination of multiple source and target input spaces. These are projected and integrated into single composite source and target spaces that thus become available for metaphoric, metonymic or other related cognitive operations. As complementary to this proposal, we take up previous work on conceptual interaction patterns carried out by Ruiz de Mendoza & Díez (2002) and examine their role in projection tasks. Since interaction patterns place constraints on conceptual projection and integration, they need to be taken into account by mental space theory. However, interaction patterns are only one kind of constraint on conceptual projection. They allow us to know about interaction possibilities but they reveal nothing about the kinds of cognitive operation which underlie the projection and integration of conceptual structure from different mental spaces. So we will also address the issue of how such operations govern the flow of information into what we call the projection space and they ultimately determine the final form it takes.

1. Mental spaces and blending

A mental space is a small conceptual packet built up provisionally for the purpose of performing certain cognitive operations (Fauconnier & Turner,

1996: 113). It must be noted that a mental space is a dynamic construct that derives its structure from a non-dynamic conceptual repository. In this respect it differs from the notion of 'idealized cognitive model' -put forward by Lakoff (1987) and widely accepted nowadays in the cognitive linguistics community- which is used to refer to different forms of conventional knowledge such as Fillmore's (1985) *frames* (conceptual structures with processes, roles, and participants), Johnson's (1987) *image-schemas* (such as the notions of 'container' and 'path'), metaphor, and metonymy (cf. Lakoff & Johnson, 1980). In fact, some metal spaces (like metaphoric inputs) import their structure from frames or image-schemas, while others (like blends) are the result of an integration process, like the one triggered off by a metaphoric or a metonymic mapping.

Blending theory is a theory of conceptual projection and integration of mental spaces. In metaphor processing and production, it is proposed that there are usually four mental spaces involved. Two of them, which would roughly correspond to the traditional source and target domains of Lakoff & Johnson's (1980) metaphor theory, are called INPUT SPACES. Input spaces have elements that correlate on the basis of the generic structure that they have in common and which constitutes a GENERIC SPACE. There is a fourth space, the BLENDED SPACE or BLEND, which derives its structure from the correlated inputs. Blends exploit and develop counterpart connections between input spaces and in so doing integrate simple related events into more complex events. Blends are dynamic (during blending conceptual work involving the activation of new spaces and the modification of previously activated ones may be required) and they may have structure which is not provided by the input spaces. In fact, they may even contain emergent structure inconsistent with that of the input spaces. The four-space model is diagrammed in figure 1 below.

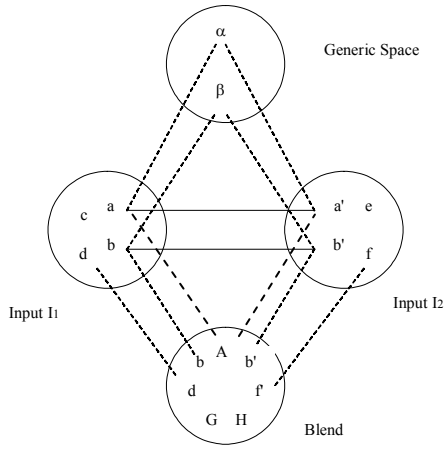

Figure 1. Turner & Fauconnier's four-space model.

By way of illustration of how this model works, consider the following example, taken from Fauconnier & Turner (2001). In it, a clipper, *Great America*, which currently sails from San Francisco to Boston, is involved in an imaginary race against the *Northern Light*, which did the same journey in 1953. In order to understand this situation, we need to combine the following mental spaces: one input space for the passage of the Northern Light in 1953; another for the passage of the present run by the Great America; a generic space, which extracts structure common to the two input spaces (i.e. a ship makes a journey of a certain duration from a source to a destination); and the blended space into which the Northern Light and the Great America are projected as taking part in a race. The blended space has emergent structure that does not exist in any of the input spaces, where there is no competition between two ships, but only two separate journeys carried out on different dates.

A different but comparable situation is provided by the analysis of the expression *You could see the smoke coming out of his ears* (Turner & Fauconnier 2000: 136). In terms of Turner & Fauconnier's analysis, if we postulate a cross-domain mapping in which the source consists of a container (typically a pot or a kettle) with boiling water and the target a person's head, there arise some inconsistencies: boiling water gives off steam, not smoke, which is naturally released through an opening which, unlike the ears, is not found on the sides of the container. The natural solution for Turner & Fauconnier is to think of the blend as inheriting part of its structure from the source input and part from the target input, while it also has emergent structure which is produced by the blend itself.

2. The combined input hypothesis

The existence of emergent structure and of non-correspondences is a peculiar feature of blends in Turner & Fauconnier's proposal. However, this hypothesis, which we shall call the *emergent structure hypothesis*, has been questioned by Ruiz de Mendoza (1996, 1998) and Ruiz de Mendoza & Díez (2002). These authors give alternative accounts of some of Turner & Fauconnier's best-known examples of metaphor in terms of the activation of multiple source inputs which, after being combined and integrated into one single source, correlate with relevant elements of the metaphoric target. We shall refer to Ruiz de Mendoza & Díez's proposal as the *combined input hypothesis*.

In order to show the explanatory power of the combined input hypothesis, we shall consider again the example of the race between the Northern Light and the Great America. Under this hypothesis, the race frame is not created by the blend, but derived from pre-existing, already available knowledge about

races, i.e. from an extra input space, and, if this is correct, a revision of their explanation is required. In this alternative view, the Northern Light vs. Great America example requires the activation of three input spaces: one containing the journey of the Northern Light; a second one providing a characterization of the journey of the Great America; and the third one supplying information about races. Once the two clippers have been assigned the racers' role in the projection space (the blend in the standard four-domain model), whatever the two clippers do will have to accord with the conceptual structure of the domain of races. This situation may be represented in figure 2 below.

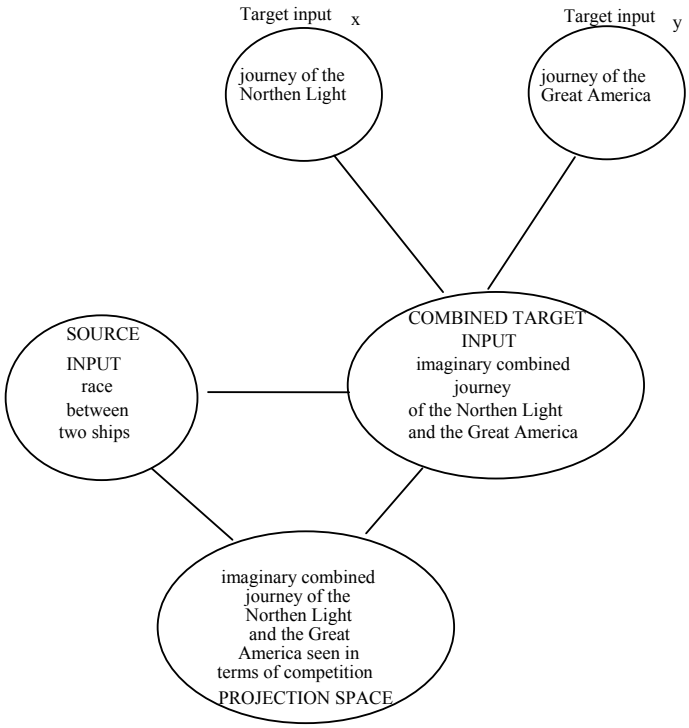

Figure 2. Imaginary race between the Northern Light and the Great America

Let us now go back to the sentence *You could see the smoke coming out of his ears*. We analyze this example in terms of the activation of two combinable source inputs: one selects its structure from the container image-schema; in the other there is a burning object or substance (e.g. firewood) which produces smoke. The target input has a very angry person. External signs of anger (sweat, redness) in the target correlate with external signs of combustion inside the container (smoke, heat) in the composite source. Figure 3 below captures the essentials of this process.

In the combined input hypothesis the presence of more than one combinable source or target input is not always necessary. Thus, it is often the case

that one single source is able to provide all the structure needed to correlate all relevant elements of the metaphoric source and target. Let us consider in this regard Grady, Oakley & Coulson's (1999: 103) discussion of the metaphor *This surgeon is a butcher*, which a faithful application of what we have labeled the emergent structure hypothesis. According to Grady, Oakley & Coulson (1999), Lakoff's traditional two-domain model of metaphor would give an account of this expression in terms of direct projection from the source domain of butchery to the target domain of surgery. This projection would be guided by a number of counterpart mappings: from 'butcher' onto 'surgeon', from 'animal' onto 'human being', from 'commodity' onto 'patient', from 'cleaver' onto 'scalpel', among others. However, these authors believe that there is a crucial meaning element that is eluded in the traditional analysis: the suggestion that the surgeon is incompetent. In their view, this notion is not projected from the source to the target, since butchers are typically competent at what they do. Grady, Oakley and Coulson (1999) conclude that the idea that the surgeon is incompetent is emergent structure, peculiar to the blend, which results from contrasts between surgeons and butchers, a factor that goes beyond a cross-domain mapping. Thus, the blend combines the surgeon's goal of healing his patients with the butcher's means of achieving his own goal of cutting flesh. The blend does not import either the butcher's goals or the surgeon's conventional means of performing surgery.

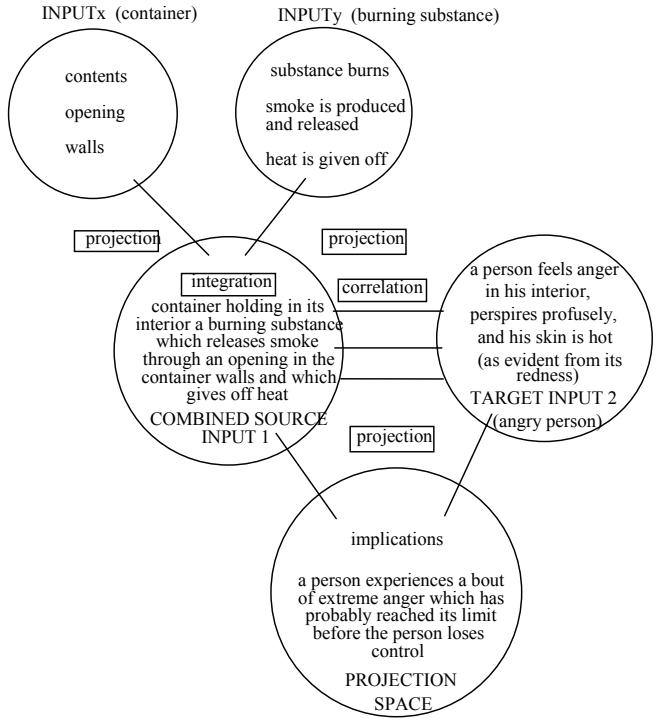

Figure 3. Conceptual interaction in *You could see the smoke coming out of his ears*

The problem with this analysis is that it makes the strong claim that in the blend there is actual integration of conceptual elements from the source and target. However, such integration would involve an interpretation of *This surgeon is a butcher* in which the surgeon, in doing surgery, actually performs the same movements as a butcher cutting up an animal. If there is no actual integration of elements but only correlation and contrast, we can make the weaker but more plausible claim that there is only similarity between the way a butcher and the surgeon work. Thus, we think of the surgeon using his scalpel in a careless or clumsy way; a comparable way of using the cleaver is not careless in a butcher's activity, since much less accuracy is required. In any case, the idea that the surgeon in this metaphor is incompetent is not emergent structure any more than other implications that follow naturally from the correlation and consequent comparison of the metaphorical elements in correspondence. For example, another implication of the metaphor concerns the probable poor state of the patient after the figurative butchery; and still another is the surgeon's lack of concern for or perhaps his unawareness of his own incompetence. These observations lead us to conclude that while it is correct to state that the blend has emergent structure (i.e. new structure arising from correlation and contrast), it is not accurate to maintain that this structure is the result of integrating non-corresponding elements.

It must be observed that integration in the combined input hypothesis is limited to cases of multiple source or target domains. In examples like the surgeon-butcher metaphor there is no integration but only correlation and contrast. We see some of the characteristics of one domain in terms of some of the characteristics of another domain. This allows us to derive meaning implications that are projected into the blend. The blend is thus the repository not only for explicit but also for implicit knowledge. This issue will be addressed in some more detail in section 5 below.

To sum up, the difference between the two conceptual projection hypotheses is evident from the comparison between the standard model as represented in figure 1 above and the diagram in figure 4 below.

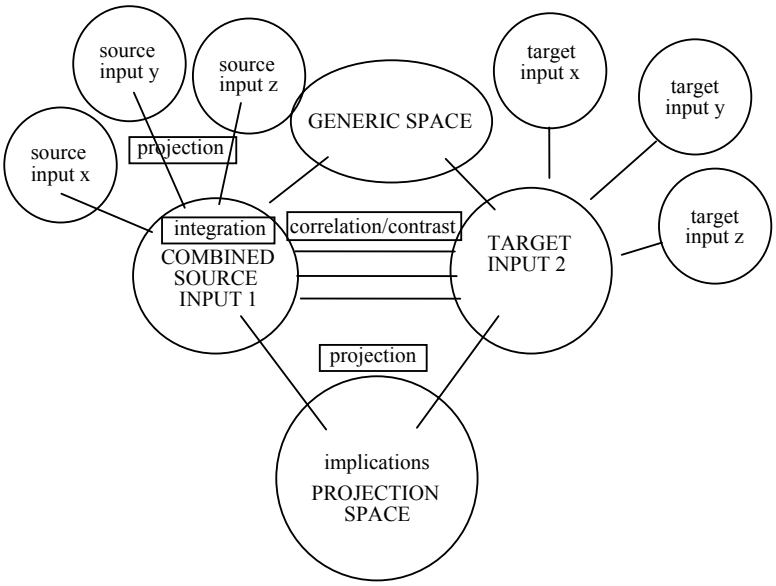

Figure 4. Combined input hypothesis

The combined input hypothesis preserves some of the most relevant characteristics of Turner & Fauconnier's account. Thus it retains the notion of 'mental space' as a dynamic construct which derives its structure from an idealized cognitive model or from other mental spaces. It also retains the basic correlational structure between source and target inputs and the notion of generic space as a mental space containing generic structure abstracted away from source and target. Finally, it makes use of the notions of 'projection' and 'integration' as two crucial cognitive operations involved in conceptual interaction. However, there are a number of significant differences between our own account and Turner & Fauconnier's. We make the following claims:

- The label "blend" may not be retained. It is more accurate to use the alternative term "projection space". Unlike a blended space or blend, a projection space is the result of ongoing cognitive activity, not the creator of such an activity.
- Projection spaces (i.e. the counterpart of Turner & Fauconnier's blends) do not contain structure inconsistent with the structure projected from the input spaces. The apparent existence of emergent structure is explained in terms of the activation of multiple conceptual spaces that interact according to a range of possible operations and constraints.
- Projection spaces are not dynamic in the sense that Turner & Fauconnier postulate for blends, i.e. by being able to create their own emergent structure independent of the structure provided by the in-

put spaces. Instead, we consider projection spaces to be the outcome of previous cognitive activity.

- Cognitive operations like integration, correlation, and contrast play a prominent role in regulating the outcome of the projection process. Other operations are also considered (see section 3 below): domain expansion, domain reduction, strengthening, mitigation, completion, counterfactual conditioning, and probably others.
- Conceptual projection is also constrained by conceptual interaction patterns (see section 4 below).
- Projection spaces may become inputs for further conceptual projection operations, as in implicature derivation processes (see section 5 below). These operations abide by all the constraints indicated above.

There are, in our view, three clear advantages of the combined input hypothesis over the emergent structure hypothesis. One is that there is no need in it to postulate the existence of non-correspondences or inconsistencies in the correlational structure of the metaphor. Another is that a projection space is, in consonance with the nature of other mental spaces, the result of cognitive activity and not the producer of such activity. The third one is that the operations of correlation and integration are assigned their proper places: in the combined input hypothesis, correlation takes place before conceptual structure is integrated into the projection space; in the emergent structure hypothesis, correlation is partly a matter of the blend, as the result of an irregular projection system.

From our discussion so far, it will have become evident that the notion of 'cognitive operation' plays a central role in the creation of projection spaces. In what follows we shall examine in greater detail the implications of this notion for our account.

3. Cognitive operations

By a cognitive operation we mean a mental mechanism whose purpose is to derive a semantic representation out of a linguistic expression (or of other symbolic device, such as a drawing) in order to make it meaningful in the context in which it is to be interpreted. Here a brief terminological digression may be in order. The terms COGNITIVE and CONCEPTUAL sometimes seem to be used rather interchangeably in cognitive linguistics. For example, many cognitive linguists would accept to use CONCEPTUAL MECHANISMS as synonymous with COGNITIVE MECHANISMS. However, it may be wise to reserve the term COGNITIVE to refer to mental processes and the term CONCEPTUAL to talk about the outcome of such processes. Thus, it should be preferable to

speak of conceptual interaction, if our focus is on the different interaction patterns that emerge out of cognitive activity. By the same token, it would be more appropriate to talk about COGNITIVE MECHANISMS to underscore their dynamic nature. The notion of COGNITIVE MODEL, first proposed by Lakoff (1987), was conceived as having both a processual and a resultative aspect. As an organizing principle (e.g. a metaphoric mapping), it has a dynamic nature. In this case, the term COGNITIVE MODEL would seem to be more felicitous. On the other hand, a cognitive model is often seen as the result of the activity of an organizing principle (e.g. a metaphor). It may be suggested that the term CONCEPTUAL MODEL may be used in the latter case.

Metaphoric and metonymic mappings seem to be clear cases of cognitive operations. However, saying that a mapping is a cognitive operation, although correct, is an oversimplification. Let us see why. A cognitive mapping is defined as a set of correspondences between two (conceptual) domains. In metaphor the mapping is carried out across discrete conceptual domains; in metonymy, the mapping is internal to one domain, i.e. there is a domain-subdomain relationship where a subdomain may map onto the domain it belongs to or, conversely, a domain may be mapped onto one of its subdomains. The fact that metaphoric mappings are domain-external and metonymies are domain-internal has important consequences in terms of the kinds of cognitive operation that support the mapping.

3.1. *Correlation and contrast*

Metaphors may be classified from various perspectives, such as the ontological nature of the domains involved, their degree of genericity, the complexity of the metaphoric operation, the number of correspondences in the mapping, and the nature of the correspondence between source and target. The typological issue has been addressed in some detail in Ruiz de Mendoza & Otal (2002: 43-50). Here we are only concerned with the last of the perspectives mentioned above. In this connection, Grady (1999) has distinguished between CORRELATIONAL and RESEMBLANCE metaphors. The former involve a correlation between different but naturally co-occurring dimensions of experience, as in CONSCIOUS IS UP/UNCONSCIOUS IS DOWN (e.g. *Get up*, *He fell asleep, He sank into a coma*), which correlates the experience of humans (and most mammals) rising up when they awake and lying down when they go to sleep. The latter take place when source and target have comparable attributes, as in *John is a lion*, where we think of John as having the same kind of instinctual courage and fierceness which we observe in lions.

The previous examples have allowed us to see that comparing and correlating are different forms of cognitive operation which underlie metaphoric mappings. In our view, these two operations may combine to yield a complex

range of meaning implications. Consider the metaphor *Journalists dug up some interesting facts*. In it we see the discovery of unknown information by journalists in terms of diggers finding hidden objects (typically treasures or archeological remains) by removing them from the ground. Journalism and treasure-hunting have enough features in common to license the metaphor INVESTIGATING (A PROBLEM) IS EXPLORING (A LANDSCAPE). But in our example, this metaphor works in combination with the correlational metaphor KNOWING IS SEEING, which is based on the primary experience of getting information through vision (Lakoff & Johnson 1999: 54). The combination of the two metaphors allows us to derive the implication that, just as an object which is taken out of the ground becomes accessible to visual inspection and therefore to intellectual apprehension, whatever the journalists have been able to reveal is now available for other people to know.

3.2. *Expansion and reduction*

Generally, metaphoric mappings work on the basis of many correspondences, although some metaphors only seem to exploit one correspondence, as in *My tender rose abandoned me*, where only one relevant attribute of roses (i.e. the kind of feelings it evokes by virtue of its beauty, scent, and color) is at work in the mapping from plant to person. Metonymic mappings are also based upon one correspondence. In this case, this is the consequence of the domain-subdomain relationship that is definitional of metonymies. Thus, it would be impossible to map more than one element of a subdomain onto the domain to which it belongs, or conversely to map a whole domain onto more than one of its subdomains. In this view, one of the domains involved in a metonymic mapping acts as a MATRIX DOMAIN for all the subdomains which depend on it. The term "matrix" captures the two crucial ideas of structured dependency and primariness that characterize domain-subdomains relationships. Thus, in *The child broke the window*, 'window', the matrix domain, maps onto 'window pane' (one of its subdomains). In *He gave me a hand*, 'hand' maps onto 'help (as if with the hand)', where 'hand' is an instrumental notion within the domain of 'help'; as such, 'hand' is a subdomain of the matrix domain 'help'.

The two kinds of metonymic relationship between a matrix domain and its subdomains have allowed Ruiz de Mendoza (1997, 2000) to make a distinction between SOURCE-IN-TARGET and TARGET-IN-SOURCE metonymies. In the former the source is a subdomain of the target, while in the latter it is the target that is a subdomain of the source. The distinction might at first sight seem inconsequential, but it is easy to see that this is not the case once we examine the different cognitive and communicative roles assigned to each of the two choices.

Consider again the target-in-source mapping from 'window' to 'window pane'. The role of this mapping is to bring into focus that part of the matrix domain that is relevant for interpretation. By highlighting this relevant domain we perform a cognitive operation which results in the reduction of the conceptual domain involved in the metonymy. Conceptual reduction by highlighting is an economical operation for the speaker: it is the addressee's task to determine the relevant subdomain. The economy of this kind of metonymy is evident from a sentence like *Marlboro has decided to challenge the new anti-smoking campaign*, where it is difficult to pin down the right target with accuracy. Thus, it is completely unnecessary for both speaker and addressee to know who is actually responsible for the policy of Marlboro in relation to the anti-smoking campaign. It is enough to assume that the decision has been made by someone who has the authority or the responsibility to do so. In fact, it would be fairly unnatural, even cumbersome, for the speaker to use a longer description like "the person or persons in charge of dealing with anti-smoking campaigns". In much the same way, it would be unusual in many contexts to be explicit as to what part of the window has been broken if it is the window pane that we are referring to (cf. *The child broke the window pane*), rather than other parts of a window like the frame (cf. *They even had to break the window frame to make their way into the house*). Note that the pane is the most prominent and breakable part of a window, which makes this element the easiest to access by means of metonymy.

Now think of the mapping from 'hand' to 'help provided as if with the hands'. What we have here is domain expansion, a cognitive mechanism by means of which a subdomain is developed into its corresponding matrix domain. This cognitive operation is the exact reverse of domain reduction. Thus, while domain highlighting reduces the semantic scope of a conceptual representation, domain development gives rise to an expanded conceptual domain. Like reduction operations, domain expansion is economical for the speaker too, but for a different reason. Here the speaker works by providing limited information under the assumption that it will be developed by the hearer into the relevant conceptual representation. It is also economical for the hearer since it is his task to determine the actual scope of the resulting domain in such a way that potentially non-relevant material is left out.

3.3. *Completion or saturation*

Utterances may have incomplete and expanded versions. The context of situation provides us with the conceptual material that is used to expand an utterance into a fully interpretable form. For example, the utterance *John's not good enough* demands completion in such a way that it is specified what it is that John is not good for (e.g. *John's not good enough for an executive position*). Completion operations have been studied in the pragmatics literature

under different labels. Bach (1994) uses the label "completion", but Sperber & Wilson (1986) deal with this phenomenon as another form of enrichment, while Récanati (1989) favors the label "saturation". Completion is not to be confused with what we have called domain expansion. The former is a grammatical phenomenon: there are some constructions (e.g. *be good for*, *be enough for*, *be ready for*, *be ready to*, *finish +ing*) which can dispense with the prepositional object. If not present in the expression, the prepositional object has to be supplied from the context for the utterance to be interpreted. Domain expansion, on the other hand, is not a constructional problem but a purely conceptual one where part of a domain stands for the whole matrix domain to which it belongs.

3.4. *Mitigation*

Let us now think of scalar concepts like height or weight. If taken literally, the sentence *John is as tall as a mountain* describes a factual impossibility. However, in a non-literal interpretation we understand that what is meant is that John is extremely tall, so much so that we feel impressed. *John is as tall as a mountain* is actually a hyperbolic expression, an exaggeration that is intended to be evident to the addressee. In this respect, it is interesting to note that the semantic impact of this hyperbolic statement is the result of a cognitive mapping from mountains to people. We understand the impressiveness of John's tallness in terms of the impressiveness of the height of a mountain. However, this mapping is different from most parallel metaphoric mappings. Thus, in *John is a lion*, where we see a form of human behavior in terms of corresponding animal behavior, it is possible to think of John's courage as rivaling or at least equaling a lion's attributed courage. This is not the case in *John is as tall as a mountain*. A human being and a mountain could not possibly have the same size. There is a clash in the topological structure of the two domains, which needs to be solved. So, after the mapping operation takes place, it is necessary to carry out a mitigation operation that adapts the scalar notion of height to human standards.

In general, hyperbolic statements require *mitigation* operations. Thus the predicate in *This suitcase weighs tons*, as uttered by a person who has to carry the weight, is to be mitigated into 'a lot'. However, mitigation is not, of itself, enough to understand the meaning implications involved in this sentence. There is a previous mapping from extremely heavy things (i.e. objects which actually weigh tons) to heavy suitcases (i.e. which may weigh a few pounds). In the mapping, we see the physical and psychological effects of the weight of the suitcase on the protagonist (i.e. the person who has to carry its actual weight) in terms of the effects that we believe would be caused by an object which weighs several tons (frustration, anger, impotence, among others).

3.5. *Strengthening*

Scalar concepts are not only amenable to mitigation but also to the converse operation, which may be called *strengthening* or *reinforcement*. Sperber & Wilson (1986) have already identified this cognitive operation under the label of "enrichment" in the context of inferential pragmatics. For them, enrichment is one of the tasks which, together with linguistic decoding operations, allow to derive a form of pragmatic inference called *explicatures* or explicitly communicated assumptions (see Ruiz de Mendoza, 2002, and Ruiz de Mendoza & Pérez, 2002, for a detailed discussion of the compatibility of this aspect of relevance theory with cognitive semantics). Sperber & Wilson discuss truistic and vague expressions like *some time* and *some distance* in sentences like *It will take some time to repair your car, sir* or *The park is some distance from here*. In principle, "some time" and "some distance" may refer to any stretch of time or space. But in some contexts the former will mean 'a (fairly) long time' and the latter 'a (fairly) long distance'. For example, if a person takes his car to be repaired and he is warned that it will take "some time" to do his car, he will have to assume that the repair work will be considerably longer than she expected. For Sperber & Wilson this kind of inference is a development of the blueprint provided by the linguistic expression and it is obtained through enrichment. An enriched representation contains the same information and more than the initial representation. Récanati (1989) uses the label "strengthening" to refer to the same phenomenon.

3.6. *Counterfactual operations*

Let us now consider the following expression, discussed by Turner & Fauconnier (2002: 470) in the context of blending theory:

(1) If Clinton were the Titanic, the iceberg would sink.

The context for this sentence is the time when President Clinton seemed to be surviving political damage from a number of sexual scandals and the film *Titanic* was popular. For Turner & Fauconnier, there is a partial cross-space mapping between two input spaces: one features President Clinton and his scandals; in the other, the purportedly unsinkable Titanic hits an iceberg and sinks. Clinton is the counterpart of the Titanic and the scandals are the counterpart of the iceberg. Then, there is a blended space where Clinton is the Titanic and the scandals are the iceberg. The blend draws part of its structure from the Titanic input space (the source, where there is a voyage by the Titanic which runs into something enormous in the water) and part from the Clinton input space (the target, which provided the blend with its causal and event shape structure). In the blend, the Titanic is unsinkable after all and it is

possible for ice to sink. These inferences do not come from the source, where the Titanic does sink, or from the target, where Clinton merely seems to be surviving the scandals. In the blend, instead, the scandal-iceberg is the greatest conceivable threat and the Clinton-Titanic survives even this kind of threat. This structure is, according to Turner & Fauconnier, constructed in the blend and projected back to the target input to reframe it and give it new and clearer inferences.

The Clinton-Titanic example is a case of counterfactual statement. Counterfactuals are usually equated with conditional statements that have a false antecedent. However, not all conditionals of this kind are true counterfactuals. Thus, the sentence *If I had been born a woman, I'd hate short skirts* is an impossible conditional since I was born a man. But the false situation described in the antecedent is conceivable: people can be born male or female. Or think of Lewis's (1973) well-known example *If kangaroos had no tails, they would topple over*. We know that kangaroos have tails but it would not be impossible to conceive of a situation in which kangaroos have no tails (think of malformations). These conditionals spring from an implication whose reason we can understand, not from imagining an alternative world. Conditionals of this type contrast with what we may call a true counterfactual, like the Clinton-Titanic example, in two ways:

> (i) In a true counterfactual, the antecedent (*protasis*) is not only impossible but also unconceivable (i.e. Clinton could not possibly be the Titanic); in fact it has a metaphoric element in it, i.e. we are required to map the event of the Titanic hitting the iceberg onto the situation in which Clinton is faced with one scandal after another.
> (ii) In a true counterfactual, the consequent (*apodosis*) describes an impossible situation or event (e.g. sinking ice). This is not necessarily the case in an impossible conditional, where the consequent may be true or not. For example, in *If I had been born a woman, I'd hate short skirts,* we do not know if the speaker would actually have hated skirts had he been born a woman.

It may be observed that there are limiting cases of impossible conditional like *If I had been born a cat, I'd hate cat's food*, which partially resemble pure counterfactuals. In this example, it would be a matter of controversy whether it is possible or impossible for a person to be born a cat (this will even depend on cultural beliefs like reincarnation). However, this possibility or impossibility is immaterial to the extent that there is no metaphoric element in the protasis and the apodosis does not describe something impossible.

Since counterfactuals are essentially figurative, it should not be surprising to find that they share a number of relevant properties with hyperbole. Thus, while sometimes hyperbole describes possible-though highly unlikely-states

of affairs, it will usually present the hearer with an impossible state of affairs (except in a fictional world). In effect, it is possible to conceive a suitcase that weighs tons. Think of a giant suitcase specially made with the purpose of breaking a record for the Guinness. However, it is impossible to find a man that is literally as tall as mountain. In both cases, a hyperbole communicates a situation or a state of excess that either bothers or impresses the speaker. Counterfactuals are evident impossibilities intended to create in the hearer basically the same effects. Thus, in the Clinton-Titanic example, the speaker expresses his astonishment at Clinton's ability to survive an extremely difficult situation. Interestingly enough, the difficult situation itself is seen in terms of an impossible situation (it may be possible to survive a series of consecutive scandals but it would have been impossible for the Titanic to sink the iceberg). The hyperbolic effect is derived from this mapping from impossible to hardly likely. It is because of this mapping that it is possible to consider counterfactuals as extreme cases of hyperbole.

There are also differences. Hyperbole is based upon single scalar concepts ('weight', 'size', 'height', etc.) and counterfactuals on situations. In fact, counterfactual statements are constructed on the basis of what Ruiz de Mendoza & Otal (2002: 82) have called situational metonymies, where an especially relevant episode within a situational or eventive frame stands for the whole frame. In the Clinton-Titanic example, two situations are accessed metonymically: one, in which Clinton is beset by sexual scandals; another, in which the Titanic hits an iceberg and sinks, against all predictions, with the result of the horrible loss of much human life.

4. Interaction patterns

Ruiz de Mendoza & Díez (2002) distinguish between interaction based upon metaphor-metonymy combinations and interaction based upon combinations of other models (e.g. propositional structures and image-schemas). In this section, we shall give a brief outline of the different combinations of cognitive models and their motivation. In our view, such combinations place preliminary constraints upon conceptual projection tasks.

One crucial observation made by Ruiz de Mendoza & Díez is that, in cases of conceptual interaction between models with different degrees of genericity, the most generic model provides the blueprint for the activation and integration of other less generic models. For example, in such expressions as *She's in trouble*, *We're out of trouble now,* and *He went into trouble*, the concept 'trouble', which is endowed with a negative axiology, is seen in terms of a CONTAINER image-schema, i.e. as a bounded region in space. Once inside this figurative bounded region the protagonist is affected by the conditions prevailing inside it. If able to get out of it, the container will no longer have any

effect on the protagonist (see Peña 1997, for a detailed study of structure and logic of this image schema). In each of these three examples, the protagonist interacts with the CONTAINER schema by becoming part of its structure and logic.

As Peña (1999a, b, 2002) has studied in detail, some image-schemas are more basic than others that are subsidiary to the former. When a subsidiary schema interacts with a basic schema, the former is built into the structure and logic of the latter. For example, take the expression *We have had our ups and downs*, as uttered by two lovers who find themselves at a point where they feel they have made progress in their relationship in spite of difficulties. The most crucial aspects of the meaning of this expression are accounted for in terms of the interaction between the PATH and VERTICALITY image-schemas. The PATH schema is the embedding schema which accounts for the context specified above. It licenses the activation of the LOVE IS A JOURNEY metaphor (cf. Lakoff, 1993), in which lovers are seen as travelers, the love relationship as the vehicle, difficulties in the relationship as impediments to travel, and the lovers' common goals as the travelers' common destination. The VERTICALITY schema associates higher positions with vantage points and is thus endowed with a positive axiological load, whereas lower positions are negative (cf. Krzeszowski, 1993). Within the context of the lovers' figurative journey along a path, the ups and downs map respectively onto good and bad moments in the love relationship. In this sense, the VERTICALITY schema becomes part of the structure and logic of the PATH schema: journeys can have good and bad moments just as love relationships.

The principle of interaction we have just presented has an important role to play in the creation of combined spaces. A clear case is our discussion of the sentence *You could see the smoke coming out of his ears* (figure 3 above), where $input_Y$ (the burning substance which gives off smoke and heat) becomes part of $input_X$ (the container) and not the other way around. Another clear case is provided by the imaginary race between the Northern Light and the Great America. Here we have two levels of integration: one in which the two journeys are combined into one, thus yielding a combined target input; another in which the source input provides the structure (i.e. a ship race) to see the Northern Light and the Great America as competing in the projection space.

Metaphor and metonymy are, in their turn, a fruitful source of interaction possibilities. These have been exhaustively investigated in Ruiz de Mendoza & Díez (2002). Here we provide just a brief overview with minor refinements oriented toward the explanation of their role in conceptual projection tasks. There are four main patterns each of which may have a number of variants or subsidiary patterns: (i) metonymic expansion of (part of) a metaphoric source

input; (ii) metonymic reduction of (part of) a metaphoric source input; (iii) metonymic expansion of (part of) a metaphoric target input; (iv) metonymic reduction of (part of) a metaphoric target input. These patterns are represented in figures 5 to 8 below.

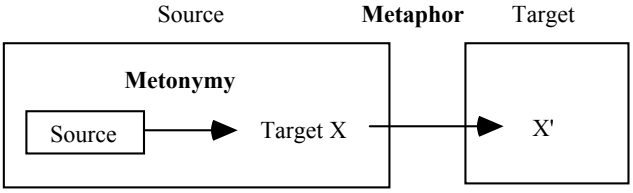

Figure 5. Metonymic expansion of a metaphoric source

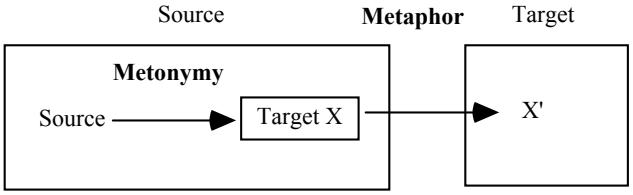

Figure 6. Metonymic reduction of a metaphoric source

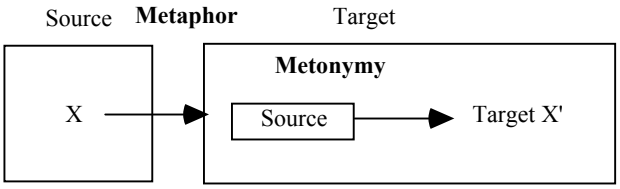

Figure 7. Metonymic expansion of a metaphoric target

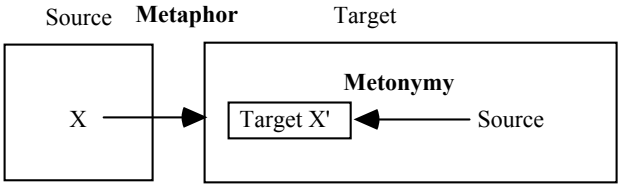

Figure 8. Metonymic reduction of a metaphoric target

In order to illustrate the first possibility, i.e. metonymic expansion of the metaphoric source in terms of the combined input hypothesis, let us discuss the expression *beat one's breast.* Goossens (1990) has aptly studied this and similar body-part expressions (e.g. *speak with one's tongue in one's cheek*, *be closed-lipped*) as cases of metaphor derived from metonymy. In Goossen's view, the metonymic basis of *beat one's breast* ('make an open show of sorrow that may be partly pretence') is the religious practice of beating one's breast when one confesses one's sins publicly. However, rather than a metaphor with a metonymic basis, what we have is an expansion operation of the source domain of a metaphor. What is said (i.e. that someone hit his breast repeatedly) provides a point of access to a broader concept (i.e. the scene in which breast beating is performed with the purpose of showing publicly that one is sorrowful about one's mistakes). The broader concept then maps onto particular situations that have common structure. Consider in this regard the semantic implications of the sentence *He held a press conference to publicly beat his breast about his marital infidelity* in a context in which a politician wants to show repentance for his immorality in order to avert negative electoral consequences. There is no actual breast beating, only public confession, but carried out in such a way that it is not believed to be genuine. For this interpretation to take place, it is necessary to develop the source input metonymically in such a way that we have in it not only the action of a sinner beating his breast, but also the stereotypical knowledge associated with this action, i.e. that it is carried out as a way of showing genuineness and of moving God to mercy. The target in turn integrates the politician's observable actions with knowledge about infidelity and its consequences in connection with the context (the expected public opinion reaction). The elements of the expanded source input correlate with the combined target input in which we have a politician acting out his feelings in public in order to show true repentance and move his voters to forgiveness. From this correlation arises the idea that the politician pretends his sorrow in an attempt to appease his voters and avoid some kind of electoral punishment. This information is received by the projection space (figure 9).

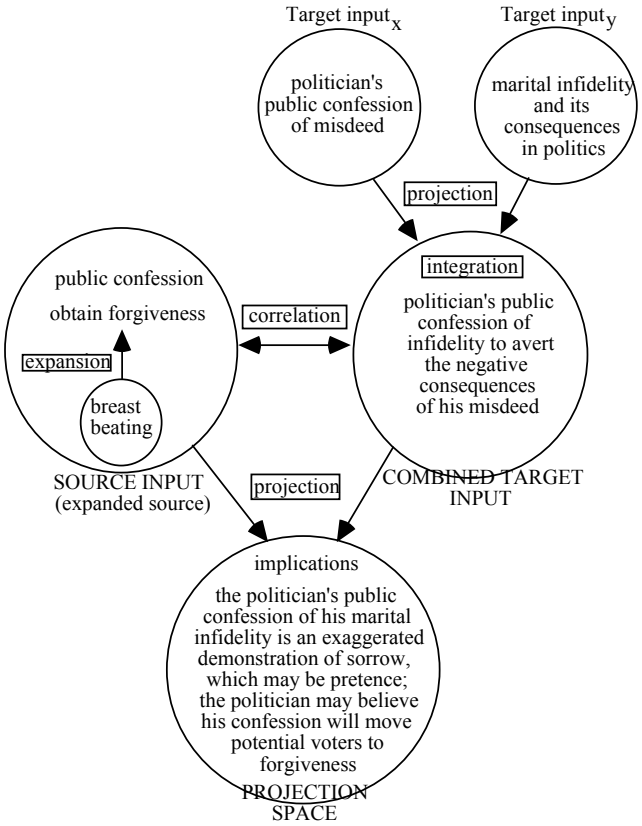

Figure 9. *He beat his breast about his marital infidelity*

The second interaction pattern, metonymic reduction of a metaphoric source, is illustrated by the sentence *She's my heart and my soul*, where the speaker's heart and soul stand metonymically for a subdomain of them, i.e. the deep emotions they figuratively contain. It is these emotions that get metaphorically mapped onto the protagonist who is thus envisaged as the main source of such emotions for the speaker.

By way of illustration of the third interaction pattern, i.e. metonymic expansion of a metaphoric target, consider the expression *The singer was given a big hand after her performance*. At one stage 'give a big hand' is a metaphor whose target domain contains a metonymy: '(big) hand' stands for '(loud) applause' or '(loud/enthusiastic) clapping of the hands' (i.e. the instrument stands for the action) in the metaphor 'give applause' where an action is envisaged as a transfer of possession (see Lakoff, 1993, for an account of this kind of metaphor). At another stage, there is a metonymy in which part

of an event (i.e. clapping hands) stands for the whole event (i.e. the audience clap their hands after the performance to express enjoyment or appreciation)[2]. Note that the fact that the idea of enjoyment is part of the explicated meaning of "give a big hand" is evident from the incongruity of the following adaptation of the utterance under analysis:

(2) ??*The singer was given a big hand after the show because nobody really liked her performance.*

Finally, the fourth interaction pattern, metonymic reduction of a metaphoric target, is illustrated by the sentence *He finally won her heart*. In it we have a metaphor from the domain of competition or contest-which involves prize winning after beating the opponents-onto the domain of courtship - which involves taking control of the loved one's emotions by persuasion and other related strategies, and often defeating other potential lovers. In this metaphor, the target has a built-in metonymy from 'heart' (the lover's "prize") to 'love'.

What metonymy has in common in all the above examples is the fact that it is part of the architecture of the metaphor and not the other way around. As Ruiz de Mendoza & Díez (2002) have pointed out, this may be related to the very peculiar nature of metonymy as a domain-internal mapping in contrast to metaphor, which is domain external. However, there is at least one additional reason in that metonymy allows us either to expand or reduce the amount of conceptual material that is brought to bear upon processing. Thus, metonymy has a supporting role for metaphor either by allowing the interpreter to develop a domain for all the correspondences of a mapping to take place adequately (through domain expansion) or by directing the interpreter's attention to the most significant part of a domain (through domain reduction). There is no comparable role for metaphor with respect to metonymy.

Furthermore, the two cognitive functions of metonymy are paralleled by corresponding communicative functions. Contrast the cognitive and communicative processes illustrated in figures 1 and 2. In figure 1 we have two cases of domain expansion through metonymy, while figure 2 is a clear case of domain reduction. From the point of view of cognition, metonymies based on domain expansion are an economical way of providing access to as much

[2] In fact, there is one further metaphor at work in this expression, i.e. IMPORTANT IS BIG (see Lakoff & Johnson 1999: 50). This metaphor allows us to conceptualize the intensity of the noise made by the audience clapping their hands (in the domain of action) in terms of the physical size of the object given (in the domain of transfer of possession). However, in being subsidiary to ACTIONS ARE TRANSFERS in the way specified, BIG IS IMPORTANT plays only a local role within the general derivation process through conceptual mappings and does not call for a third stage in the explicature generation task.

conceptual material as is necessary by just invoking a significant part of the domain which contains all that material; on the other hand, metonymies based on reduction work by providing global access to a domain of which the addressee is to choose a relevant part. Note in this connection that in the first kind of metonymy access is not global, i.e. on the basis of part of a domain, the addressee has to single out the number and type of conceptual ingredients which will eventually be activated. From the point of view of the communicative impact of both cognitive mechanisms, domain expansion is a way of providing the hearer with a rich amount of conceptual implications for very little processing effort. The hearer is responsible for the number of implications that will be derived, generally not more that needed for satisfactory interpretation in context. In conceptual interaction, this allows the hearer to develop a domain to the extent that it is ready for all necessary metaphoric correspondences to be made, as in the first stage of interpretation of "give a big hand", or for the full range of relevant implications worked out, as in the second stage of the same metaphor. Domain reduction, on the other hand, usually bases its communicative import on the relationship between the activation of a conceptual domain as a whole and the highlighting of one of its parts. Thus, in *He finally won her heart*, invoking the heart as the object of the lover's goals conveys the idea that it is not simply love feelings but also the most central part of a person's emotions that is at issue.

5. Meaning implications

As has already been noted above, the full meaning impact of a linguistic expression based on conceptual correlation and integration is to be calculated on the basis of the total range of meaning implications which the hearer is led to derive. Consider again the complex metaphor *You could see the smoke coming out of his ears*. Working out the meaning of this expression involves much more that simply seeing a certain angry person in terms of a container with burning contents. For example, smoke serves as a figurative indicator of internal combustion because of extreme heat. Real combustion generates consumption of energy and materials. In a similar fashion, figurative combustion of a person involves the person being eventually deprived of energy and vitality. That is why we can say that a person is being "consumed" with anger. This is just one out of several potential meaning implications of *You could see the smoke coming out of his ears*. There are at least two other such implications:

- The person has lost control of his anger (i.e. the figurative fire has gone unchecked until the moment of the utterance being produced).
- The person is potentially harmful for other people (in the same way that uncontrolled fire is dangerous).

These implications are independent of the context but need to be compatible with it.

There is an important connection between this analysis and the question of *explicature-generation mechanisms*, which has been explored in some detail by Ruiz de Mendoza (2002) and Ruiz de Mendoza & Pérez (2002). The notion of EXPLICATURE was first put forward by Sperber & Wilson (1986) within Relevance Theory and is to be distinguished from the more traditional notion of IMPLICATURE within inferential pragmatics. For Sperber & Wilson (1986), a proposition is explicated rather than implicated if it is a development of the blueprint provided by the linguistic expression. Implicated propositions, on the other hand, are the result of a premise-conclusion calculation where the set of premises is exclusively derived from the context (including our world knowledge) without the help of any indicators within the linguistic expression. For example, in the utterance *The park is some distance from here*, the expression "some distance" may be developed into 'quite a long distance' by means of an explicature-generating mechanism called STRENGTHENING. The same utterance can be used to warn the hearer that it will take him longer that he thought to arrive at the park, or perhaps that it would not be wise to walk to the park. These are just two out of a broad range of potential implicatures that will vary with the context of the utterance.

For Ruiz de Mendoza (2002) and Ruiz de Mendoza & Pérez (2002), it is possible to derive explicatures on the basis of conceptual mappings. Thus, from an expression like *You don't know where you're going*, we obtain the explicated proposition 'The addressee has no clear goals' on the basis of the metaphoric mapping GOALS ARE DESTINATIONS. Possible implicatures would be, depending on the context, the idea that the addressee is in trouble, that the addressee is being warned about his way of doing things, that the speaker is complaining about the addressee, etc. In a similar way, a metonymy like *The sax has the flu*, where by "the sax" we refer to 'the sax player' (INSTRUMENT FOR PLAYER), may be regarded as a way of developing the central explicature of the expression.

We may wonder about the stage of the conceptual projection process at which explicatures and implicatures occur. Ruiz de Mendoza (2002) has suggested that implicatures are a matter of the blend. This suggestion is in keeping with Turner & Fauconnier's view of the blend as a dynamic space where inferential activity takes place and with the notion of implicature as involving the activation of supplementary contextual information. The need to use such information would call for the creation of additional input spaces to be projected into the blend. Consequently, for Ruiz de Mendoza (2002), explicatures, which are simply adaptations of the conceptual material initially provided by the linguistic expression, would fall outside the blend. There are two problems with this proposal. One is that it ignores the fact that explicature

derivation, as conceived by Sperber & Wilson, is a form of inferential activity too. The other is that, as we have argued above, the blend is constructed on the basis of previous mental operations, including conceptual projection. Meaning implications are worked out before projection takes place. Thus, in our own proposal, both explicated and implicated meaning is worked out before being received by the projection space, where it is integrated with other relevant elements in terms of their inherent combinability.

The picture we are trying to draw is more complex than it seems at first sight since the derivation of implicatures requires the previous development of fully specified propositions (i.e. explicatures) which satisfy the requirements of relevance in the context of the utterance. Thus, before we use an utterance containing the expression 'some distance' as a piece of advice or as a warning (an implicature), it is necessary to make "some distance" compatible with the context in which it is produced: it may be just one or two miles, or perhaps much more (an explicature). In a similar way, before one can interpret the metaphor *You could see smoke coming out of his ears* as, say, a warning to beware of the protagonist in certain situations (this is implicated meaning), it is necessary to understand that the speaker is talking about a situation in which the protagonist is extremely angry, to such an extent that he may lose control and be potentially harmful (this is explicated meaning).

6. Conclusion

The analysis of the various cases of metaphor-metonymy interaction carried out in the previous section, although limited, is enough to understand that conceptual interaction tasks are more complex than recognized in the emergent structure hypothesis, but at the same time more clearly regulated by cognitive mechanisms such as domain expansion and domain reduction. Giving an adequate explanation of how such mechanisms work endows conceptual projection theory with a large degree of parsimony. Note that emergent structure theorists need to postulate the existence of a dynamic blend which levels out inconsistencies simply because they believe that the blend only incorporates structure which has been correlated in a careful way. In our own hypothesis, Turner & Fauconnier's blend is replaced by a projection space, which is different from other mental spaces, like input spaces, in that it does not supply information but receives and combines it. It resembles the other spaces, however, in that it is not a dynamic construct. What is dynamic in conceptual interaction is the different cognitive mechanisms and operations at work between the different spaces involved: on the one hand, we have metaphoric and metonymic mappings (i.e. forms of correlation), the latter bringing about expansion or reduction operations; on the other hand, we have a projection operation which exports structure to the projection space.

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KOGNITIVNE OPERACIJE I PROJICIRANI PROSTORI

Konceptualna integracija, vrlo raširen konceptualni mehanizam koji su svojom teorijom posljednjih nekoliko godina učinili popularnim Mark Turner i Gilles Fauconnier, očituje se u više područja konceptualizacije, uključujući tu i metaforu i metonimiju. Prema toj teoriji, razumijevanje nekih metaforičkih izraza uključuje aktiviranje najmanje četiriju različitih mentalnih prostora: dvaja ulaznih (tj. izvorišnoga i ciljnoga prostora), generičkog prostora, te integriranog prostora. Turner i Fauconnier tvrde da tijekom integracije nastaju strukture koje nisu bile prisutne niti u jednom ulaznom prostoru. Te su strukture rezultat određenog broja nepravilnosti u procesu preslikavanja, poput asimetrije i nepodudaranja između izvora i cilja. U ovom se radu kritički razmatra Turnerova i Fauconnierova teza te se tvrdi da nema nepravilnosti u konceptualnoj projekciji. Po našem su viđenju navodne nepravilnosti samo prividne te se mogu objasniti pomoću aktiviranja i sustavnom kombinacijom djelomičnih izvorišnih i ciljnih ulaznih prostora koji se projiciraju i integriraju u jedinstvene složene izvorišne i ciljne prostore. Ti složeni prostori posjeduju sve strukturne preduvjete potrebne za metaforičko preslikavanje između domena bez ikakvih nepodudaranja ili asimetrija između izvora i cilja. Također tvrdimo da je normalna interpretacija izraza koji uključuju konceptualnu projekciju i integraciju rezultat djelovanja određenog broja kognitivnih operacija poput korelacije, kontrasta, proširenja domene, sužavanja domene, pojačavanje, ublažavanja, zasićenja, te zaključivanja o nestvarnim situacijama. Naposljetku, u našem se alternativnom modelu pojavljuje projicirani prostor koji je konstruiran na temelju konceptualnih struktura koje su rezultat navedenih operacija. Taj je prostor dostupan dodatnim

implikativnim operacijama koje su često potrebne kako bi se došlo do konačne vrijednosti izraza u kontekstu.

Ključne riječi: mentalni prostori, fuzija, emergentne structure, izvorišni prostor, konceptualna projekcija, konceptualna integracija, kognitivne operacije, projicirani prostori