Yesterday is Another Country ... Image Schemas in Conceptual Blending to Optimize Human Scale Thinking

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The Neurophysiological Basis of the Theory of Mental Spaces

Fauconnier and Turner (2002:102) posit a neurobiological basis for their theory of mental spaces:

> In terms of processing elements in mental spaces correlate to activated neural assemblies and linking between elements corresponds to some kind of neurobiological binding, such as co-activation ... mental spaces operate in working memory but are built up partly by activating structures available from long-term memory.

According to Crick and Koch (2002), 'The overwhelming question in neurobiology today is the relation between the mind and the brain'. While philosophers have been studying the properties of mind since antiquity, the relationship between mind and brain has only been the subject of serious scientific inquiry for the past century and a half. Its beginnings can be traced to the work of Broca in 1861 and Wernicke in 1874 who independently started puzzling together how speech impulses are transported from the inner ear to Wernicke's area for processing of word meanings, and thereafter to Broca's area for syntactic processing (Gray 1994). Damasio (2002) argues that the great divide between theories of brain and theories of mind is being narrowed by current research about what happens in the visual cortex when brains observe graphical images. Damasio shows that neuronal arrays in the visual cortex emulate the pattern of an image that a test subject observes. This is an indication that the brain instantiates visual images in the mind by activating neuronal arrays in the same configurations as the images observed in one's

environment. Fauconnier and Turner's quotation on the previous page reveals that they foresee a time when the divide between brain and mind will have been mediated as Damasio (2002) anticipates.

Analogical Thinking and Conceptual Integration

Fauconnier and Turner's theory forms part of a family of theories that propose explanations for cognition, analogical reasoning, symbolic language capacity, and metaphor construction as forms of conceptual integration. Such theories, in one way or another, state that one extracts apparently unrelated, but comparable concepts from one's broad domains of knowledge by associating them with one another in two smaller sets of knowledge. These smaller sets are termed source and target spaces, or in Fauconnier and Turner's theory, input spaces. Such theories imply that the resultant insights are obtained when well-understood concepts from a source space (input space 1) are interrelated with concepts from a target space (input space 2). This process of interrelation serves as basis for new insights by foregrounding similarities between the sets of knowledge, while keeping differences in the background.

By foregrounding similarities and keeping differences in the background, target space concepts are analogically interpreted in relation to source space concepts. Such source space concepts can therefore be seen as a sort of a template for foregrounding major aspects of poorly understood target space concepts. By superimposing source space concepts onto target space concepts, one forms new insights about the target entity by suppressing dissimilar concepts as shown in Figure 1.

Conceptual Blending

While Fauconnier and Turner acknowledge common ground with the before mentioned theories of analogical thinking, their theory differs in significant ways by presenting a detailed set of proposals to account for how precisely cognitive processes result in conceptual blending. In essence, their theory posits at least four mental spaces of concepts extracted from one's vast domains of knowledge.

These four spaces are a *generic space*, at least *two input spaces* and a *blended space*. Fauconnier and Turner propose that during thinking particular *vital relations* and *structuring principles* are projected from a generic space

onto at least two input spaces, from where particular vital relations are compressed and selectively projected onto the blended space in the form of new insights.

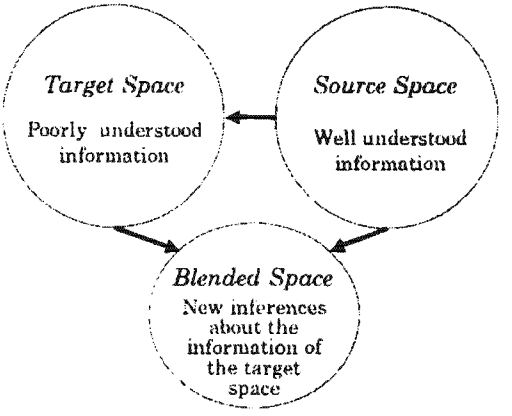

Figure 1: Foregrounding target space insights by superimposing source space knowledge and arriving at new insights during analogical reasoning

The theory also posits that the contents of input spaces are only partially comparable because input spaces share some analogical (similar) content, while they at the same contain disanalogical (dissimilar) content. Fig. 2 below presents a schematic representation of the topography of mental spaces.

It is necessary to understand, in principle, how blending is said to work, before it can be applied to specific examples. The schematic representation in Figure 2 indicates that the generic space contains all of the vital relations and structuring principles that determine how two events are constituted. Hypothetically, relations 1, 2, 4 and n are projected from the generic space to input space 1 to represent Event 1.

At the same time relations 2, 3, 5 and n are projected to input space 2 to represent event 2. The symbol *n* represents an unspecified numeral, implying that events could entail different numbers of vital relations and structuring principles. Events 1 and 2 in the schematic representation are comparable because vital relations 2 and n are projected to both of them. The blended space consists of vital relations and structuring principles 1, 2, 4, 5 and n, of which 1 and 4 are selectively projected from Event 1, of which 5 is selectively projected from Event 2, and of which 2 and n are jointly projected from Events 1 and 2.

Inferring Vital Relations and Structuring principles

Fauconnier and Turner's theory is not an abstract formulation of cognition. It has been formulated to account for everyday events in the three-dimensional world that we live in—events that we routinely observe, participate in and talk about.

According to Fauconnier and Turner, the generic space contains general concepts, termed *vital relations*, and *structuring principles* that are selectively projected as scenario-specific events to different input spaces. We are able to extract such relations and principals to a generic space by making inferences about similarities (analogies) and differences (disanalogies) between the events that we experience and observe. By way of illustration, let us consider the vital relations and structuring principles used to conceptualise two separate events,

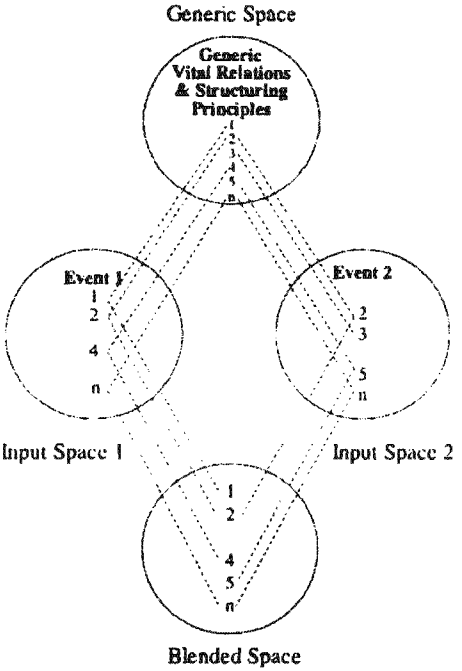

Figure 2: Schematic representation of Fauconnier and Turner's model, showing the mental spaces that are evoked during conceptual blending

(1) *A woman is stirring potatoes in a pot with a wooden spoon*, and (2) *A boy is hitting a ball through the air with a baseball bat.*

If we considered elements of meaning that were shared by these two events, we would be able to say the prominent figures of each event are respectively a woman and a boy. They have in common that they are both humans, but differ regarding age and gender. They also have in common that they both use instruments (a wooden spoon and a bat) to set objects (potatoes

and a ball) in motion. Considering elements of meaning not shared by the woman and the boy we could point out their different *roles* during the two events: the woman is a cook and the boy is a baseball player.

However, if we asked what a cook and a baseball player have in common in the above two events, we could make the generalisation that they were both actively controlling the events. We could also infer that they both used instruments, that in both events their actions affected objects that were passively involved in the interactions, and that these objects were set into motion by the actions of the active parties.

Repeated experience in formulating expressions to account for how we observe events, and repeated experience in interpreting the expressions of others, enables us to subconsciously make the general inferences that active parties during different events use instruments to affect passive objects. Therefore, we infer *generic vital relations* to account for how sentences (1) and (2) convey meaning. Similarly, repeated experience in formulating expressions, enable us to infer a common sentence pattern for (1) and (2):

[Sentence [Noun phrase AGENT] [Predicate Phrase VERB [Noun phrase PATIENT] [Prepositional Phrase 1 PREPOSITION [Noun Phrase PLACE] [Prepositional Phrase 2 PREPOSITION [Noun Phrase INSTRUMENT]]]

According to Fauconnier and Turner's theory, the generic space, as in Figure 2 above, contains all the vital relations and structuring principals that would enable one to infer the similarities (analogies) and differences (disanalogies) between the events of input spaces 1 and 2 that are blended to infer new insights in the blended space. Different input spaces contain comparable but different information because particular generic concepts are *selectively projected* to each of them.

To use another example, one input space could portray a scenario of two opponents boxing in a ring, and another input space a scenario of two opponents arguing with one another. The scenarios are clearly comparable because they portray two humans engaging in some form of confrontation, in the one instance trading blows, and in the other instance exchanging assertions and perhaps insults. The common generic elements provide a basis for comparison, enabling one to say of the arguing parties: *They are really slugging it out.* We are able to make the comparison because the generic concept AGENT is selectively projected as boxers to the one scenario, while at the same time being selectively projected as arguing parties to the other scenario.

Vital Relations

According to Fauconnier and Turner there are certain interrelated constituents of meaning that serve as vital relations because they repeatedly occur in scenarios, because they link scenarios together and because they can be compressed into other vital relations during conceptual blending. They are:

- Change
- Identity
- Time
- Space
- Cause-Effect
- Part-Whole
- Representation
- Role
- Analogy
- Disanalogy
- Property
- Similarity
- Category
- Intentionality, and
- Uniqueness

Compression of Vital Relations to Achieve Human Scale Thinking

Humans are sentient at very specific and narrow points along the electromagnetic spectrum. Some other life forms are aware at visual, auditory and tactile ranges of which we remain unaware. Insects see entities in nature differently than we do at the ultraviolet end of the visual spectrum. Dogs have the ability to hear, smell and see at auditory, olfactory and visual ranges that are far more acute than those of their masters. Raptors like eagles and hawks have special magnifying sections on their corneas that enable them to spot the movement of their prey from as high as a kilometre away, and are also

sensitive in the ultraviolet range in order to spot fresh urine on the ground, alerting them to the whereabouts of potential prey on the ground. Snakes use their tongues to sense the precise body images of their prey at the infrared range, while we only diffusely feel infrared radiation as heat on our skins. Whales, dolphins and bats form mental images of their prey by means of echolocation/sonar, to which we are oblivious without instruments. Elephants hear over large distances in the extra low frequency range and are aware of the whereabouts and moods of other herds of elephants at distant locations via sensors in the pads of their feet that are sensitive to extra low frequency vibrations transmitted underground.

In my view, different species are sentient at different points on the electromagnetic spectrum because their sensations are optimised for survival within the specific niches that they occupy in relation to one another. In the case of humans, our ability to think symbolically—to let things signify more than themselves, by letting one thing stand for another—this ability has led to the evolution of human language. It is human language that endows us with the ability to analyse present events, to reconsider past events, to envisage future scenarios, and to communicate our thoughts about these to one another. Different species abstract species-specific mental models of their environments that approximate ultimate reality, in order to optimise their chances of survival in the specific ecological niches that they occupy. Similarly, humans have evolved a symbolic language capacity for survival's sake. I consider species-specific mental models to be epiphenomenal survival-optimised approximations of ultimate reality, constrained by the neural limitations of animal brains.

Fauconnier and Turner (2002:322) explain how conceptual blending forms part of the process of achieving human-scale cognition:

> Human beings are evolved and culturally supported to deal with reality at human scale—that is, through direct action and perception inside familiar frames, typically involving few participants and direct intentionality. The familiar falls into natural and comfortable ranges. Certain ranges of temporal distance, spatial proximity, intentional relation, and direct cause-effect relation are human-friendly. Other things being equal, it is good for a blend to belong to these ranges.

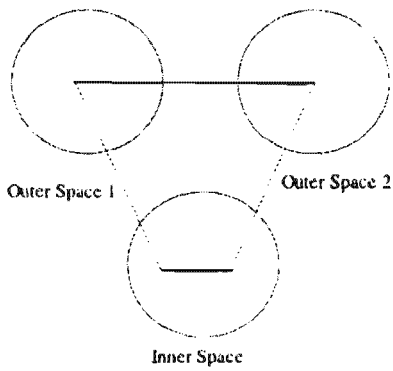

Figure 3: Compressing outer space vital relations into a new inner space relation in the blended space

Fauconnier and Turner's theory of conceptual blending presents a credible account of how humans selectively access specific aspects of our environment trough our senses, how we conceptualise those sensations through compressions during blending, and how we organise and communicate them by means of language. This however begs the question, what is the nature of these compressions?

Fauconnier and Turner (2002:92) propose that a crucial element of blending is the compression of a particular vital relation from the input spaces (outer space relations) into a more compact version of the relation in the blended space, or the compression of outer space vital relations into different vital relation in the blended space as schematically represented in Figure 3. Fauconnier and Turner (2002: 309-352) in detail discuss compression hierarchies for the vital relations Analogy/Disanalogy and Cause-Effect, which fall outside of the scope of this article. In the next section I will however briefly look at time compression and stretching, and compression by recategorisation in everyday language.

Compressions in Everyday Language

Humans reconceptualise the basic constituents of meaning all the time. Speaking about the battle for Omaha Beach in the National Geographic programme, *D-Day: Men and Machines,* one of the World War II veterans said: *On that day I learnt a trick. After that day, I never killed a man anymore. I killed uniforms.* The person speaking reclassified the wearer of the uniform to being a nonhuman entity, the uniform that he was wearing. In similar vein, when quizzed during a press conference in 2003 about the conditions under which persons are held at Guantanamo Bay (a part of the island of Cuba under USA control), the Secretary of State, Donald Rumsfeld, responded that the stipulations of the Geneva Convention did not apply to the prisoners: ... *because they are illegal combatants, not prisoners of war.* When a prominent

official in the Republican Administration of the United States of America, spoke on CNN in 2001 shortly after the September 11 attacks on the USA, he said: *We will drain the swamp where they are hiding and eradicate them!* He essentially reclassified human opponents as nonhuman ones, implying that their attacks on the USA were inhuman. In Fauconnier and Turner's terminology, this amounts to a compression of two separate outer space lexical categories (*human being* and *nonhuman life form*) into a new category (*inhuman human*).

In the last example, compression by recategorisation is achieved by projecting the category *nonhuman life form* into the blend from an outer space that contains concepts about nonhuman life forms like alligators and mosquitoes that are dangerous to humans and by projecting from the *human being* input space behaviours that grossly deviate from norms of human behaviour. By associating concepts of deviant human behaviour with swamp animals like alligators and mosquitoes, a special category of *inhumans* is established in the blend to justify envisaged search-and-destroy operations against targets.

Humans also commonly stretch out or compress time duration into longer or shorter time spans when they report having experienced exceptional events. The ex mayor of New York City, Robert Giuliani, during an interview on CNN regarding the September 11 tragedy, revealed how he experienced the stretching of time on September 11, 2001 at the World Trade Center: *I paused and looked up. I saw — it wasn't debris ... I saw a man jump from the hundred and second floor. It must have been only a second or two, but it felt like a minute or two.* By contrast, consider the following example of time compression:

Fast Forward
Single cells multiply
Divide, spawn and cling
Together, string upon string
Slime washed ashore
Slithers
Mutates
Metamorphosises
Arises
And sniffs at stars
With a lens

The verse itself builds an evolution input space of organisms that over a period of eons evolved from the single cell stage through the multi cellular and vertebrate stages to a land-existence stage during which humankind eventually becomes an upright walking, intelligent life form that uses astronomy to explore the cosmos. The title of the verse prompts the reader to conceptualise a cinematographic input space during which a film is viewed in fast forward mode. The event in the blended space—one's interpretation of the meaning of the verse—compresses time by projecting it from the cinematographic input space onto the blended space, while vital relations that relate to the progression of successive evolutionary phases are projected from the evolution input space.

In the following sections, I briefly explain some of the vital relations that in my view require further clarification than what is provided in Fauconnier and Turner (2002). I will in particular explain the theory of role relationships, which is quite complex, and of which Fauconnier and Turner, assume knowledge only available to persons with an intimate knowledge of cognitive grammar and case grammar.

A point worth making early on during the discussion of compressions is that we will be teasing apart, for individual consideration, vital relations that during cognition actually operate in unison with one another.

Change

Fauconnier and Turner (2002:93) describe change as a very general vital relation. An entity changes form, or location over time in three-dimensional space. We use transitive sentence constructions to portray how an active entity (an agent) initiates an action, supplies the energy for the action, and controls the phases of the action to cause a passive entity (a patient) to undergo changes in form (*the deli assistant sliced up the salami*), changes in place (*the farmer strew the wheat grains over the ploughed field*), changes in composition (*John used beer, rye flour, salt, yeast and sunflower seeds to bake a bread*), or changes in mind state (*the shadows frightened the child*).

Identity and Uniqueness

Identity has to do with how humans perceive a changing entity as being the same entity over time in spite of changes in form and location, how we attribute individual identities to different entities, and how we perceive self-identity over time from our childhood to the present. Humans are particularly

good at recognising (re-cognising) faces of fellow humans, and ascribing particular identities to them, even those individuals that they have not encountered for decades. Ross 1981 reported that a centre on the right inferior frontal cortex (Figure 4) showed significant activation during the assessment of facial emotion. Interestingly, the right inferior frontal cortex seems to be a mirror image of Broca's area (the frontal language area) in the left hemisphere that is involved in propositional (factual) aspects of language use.

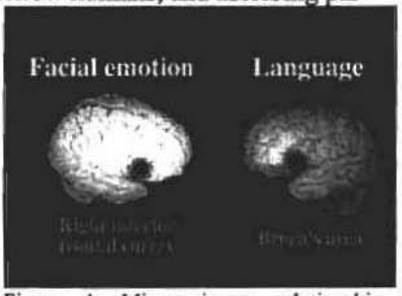

Figure 4: Mirror image relationship between Broca's area, used for language interpretation, and the right inferior frontal cortex, used for interpreting emotive facial expressions

Similar studies have reported that the right inferior frontal cortex is also associated with the discrimination of prosody and the assessment of emotion based on prosodic cues of voice. This could mean the right inferior frontal cortex is involved in the ability of humans to recognise faces because of its role in interpreting facial expressions, tone of voice and other emotional aspects of nonverbal communication.

Recognition is based on the process of identity formation, which in turn is encoded in one's long-term memory by means of several different types of memory code:

- Structural codes that relate to the shape and size of physical entities;
- Verbal semantic codes used to recognise and verbalise descriptions of entities;
- Visual-semantic codes used to recognise physical attributes of entities;
- Name codes used to uniquely identify persons and places;
- Emotive codes for registering one's emotional awareness of entities that are involved in experiences.

These different memory codes apparently can only be accessed in a particular sequence. Names are more difficult to recall than recognising

someone's facial features because name codes are accessed almost last in the code sequence. People's names are stored in a separate brain centre to their biographical details, and can only be accessed once the centre for biographical details has been activated.

Damasio (1994) proposed the somatic marker hypothesis to account for the encoding of emotions as part of event memories that include memories of the identity of individuals with whom we have interacted. According to the somatic marker hypothesis, emotional pathways form part of remembering people's names and faces. This would entail that one also activates emotional pathways as part of the activated circuitry of the brain regions that contain the different memory codes. It also implies that emotions are intimately involved in the process of long-term memory formation of people's personal identities. If you run into someone that you have met before, you will re-experience the emotion of adoration/love/lust/trust/distrust/ loathing that you felt towards her/him when the memories were formed. Emotions therefore help form and maintain the identities that we have for others on the social networks that we share with them, including their ranks on those networks that determine whether we treat them as superiors, equals or inferiors. In spite of humans' impressive ability to establish other persons' identities, person identification is not always equally successful. We could recognise a person's identity in three varying degrees:

- We could vaguely recognise the subject, without recalling any personal details about her/him.
- We could identify the subject as being a particular person, without recalling her/his name, wondering: *He's the father of my son's friend, but what's his name?*
- We could identify the subject by name, saying: *Hi, Jane. Fancy running into you here!* This level of personal identification is invariably accompanied by emotional awareness of the subject, and will frame one's attitude towards the subject.

How crucial the emotive aspect of identity formation is, can be seen from studies of the rare clinical condition, the Capgras syndrome. In this delusional mind state a person, while recognising the faces of loved ones, believes they have been replaced by impostors in the form of actors, robots, aliens in familiar shape, etc. (Tamam et al 2003 & Dietl et al 2003). This is

thought to be caused by damage to the connecting neural pathways between the areas of the visual cortex that deal with face recognition and areas that process emotional response, as well as damage to the pathways between the face recognition area in the visual cortex, and the facial emotion centre in the right inferior frontal cortex, shown in Figure 4 above.

We identify people, places and things as being unique when we perceive them to have properties that distinguish them from similar entities. In such cases, we either use names to identify them (*John Anderson, New York* or *The Eiffel Tower*), or we use definite markers like definite articles (*The Sahara desert*) and possessive pronouns (*your father*). The Capgras syndrome, discussed above, shows that one's emotional awareness of a person plays a significant role in assigning a unique identity to others.

Self-identity remains one of the most complex vital relations in people's lives. In cases of severe amnesia, whether due to neural trauma or neural degeneration, subjects suffer a complete loss of self-identity. At a specific point in time they come to the realisation that they exist, but looking into a mirror are unable to reconstruct their self-identity by recollecting their life history. They do not know who they are, where they are, where they live, how they got to where the are, what they do for a living, or who their loved ones or mortal enemies are.

Time

Fauconnier and Turner (2002:96) states that time is related to memory, change, continuity, similarity, nonsimilarity and causation. From an egocentric point of view, we distinguish a simple three-point scale, *now, yesterday* and *tomorrow* to account for present conscious awareness, past memories and future anticipations. From an anthropocentric point of view, we have to distinguish a greater range of time scales that integrate individual behaviour with those of fellow humans. Initially, in the hunter-gatherer nomadic phase of existence, humans would have used as temporal references diurnal concepts such as *sunrise, morning, midday, noon, afternoon, sunset, evening* and *midnight,* and time-of-life concepts such as *birth, childhood, youth, adulthood, old age* and *death.* Our ancestors no doubt also would have used impressionistic temporal concepts like *a heartbeat, the blink of an eye, a moment, a few moments, two ticks, a bit, a while, a long time, forever* and *eternally.* Modern humans have come to organise temporal concepts into

conventional, measured timeframes like *nanoseconds, seconds, minutes, hours, days, weeks, months, seasons, years, decades, centuries millennia* and *eons.*

Humans however are better at conceptualising three-dimensional spatial relationships than temporal ones. Consequently, we tend to metaphorically superimpose space on time to understand time better. Spatial concepts are for instance commonly used to also represent time as in:

Space	**Time**
Bounded spaces	***Short time spans***
On the table/ on the roof	On time/ on the spur of the moment
By the door	By the afternoon
Around the house	Around midday
At the door	At the moment/ night
Unbounded spaces	***Long time spans***
In the wilderness/the country/ the city	In the morning/ the week/ a year/ a lifetime
Long distance	Long time/ year long/ lifelong
Through the house	Through the night
High building	High time

Figure 5: Typical examples of rethinking time as space

Space

Humans live in a three-dimensional world and therefore conceptualise space in three dimensions, height, width and depth, shown in Figure 6:

Figure 6: Three-dimensional space

Using these three dimensions, we humans find our way about our environment. We think about points of departure, land-based paths and routes, trajectories through the air, obstacles and destinations, we think about containers with insides and outsides, with positions in front of, beside, on top of, underneath and behind objects, and we think of directions over, into, through and around objects. By combining these three spatial dimensions with time as the fourth dimension, we can say: *I will meet you in Cape Town at the airport next Wednesday.*

Cause and Effect

How important cause and effect are for humans, can be seen from the fact that a language like English contains thousands of transitive verbs used in

sentences to express who does something to whom, who does something to what, what affects whom, who allows whom to do something, who forces whom to do something, etc. Beside sentences containing transitive verbs that express causality, cause and effect are also expressed in sentences containing conjunctions like *because (of), in order to, due to* and *as a consequence of.*

Representation, Category, Property, Analogy, Disanalogy and Similarity

Theories of representation give accounts for how humans internally represent their environments. Some models propose theories of mind that provide mental models for analogical representations, propositional representations, distributed representations and structural representations. Other models propose neurologically based conceptual representations that relate to semantic webs, schemas and scripts. Fauconnier and Turner's theory of conceptual blending invokes both types representations. According to Mustonen 2003, while mental representations have been studied for several millennia as part of theories of mind, neurologically based conceptual representations have only recently become possible through neuroscience, particularly through a variety of neuro-imaging technologies.

Categorisation of entities, based on their physical and behavioural properties, forms the basis of representation. We can distinguish three levels of categorisation, namely a superordinate level that contains generic concepts like *animal* and *plant*, a basic level that contains concepts like bird and *fish*, and a superordinate level that contains detailed, concepts such as *canary*, *ostrich*, shark and *salmon* as in the schematic taxonomy in Figure 7.

There are a number of important aspects of the above three levels of categorisation that we should note:

- Any lexeme (like *animal*) is understood in terms of a bundle of conflated properties like *have bodies consisting of organs, are conscious of their environment*, etc.
- A generic lexeme like *animal* hyponimically includes thousands of other lexemes on the taxonomy. *Animal* for instance refers to all types of warm blooded animals, all types of birds, all types of fish, all types amphibians, all types of reptiles, all types of insects, all types of arachnids. How vast these networks of meanings are in our mental

lexicon, can be deduced from the fact that there are about 2000 species of mammals, and 200 types of bats (an atypical type of mammal).

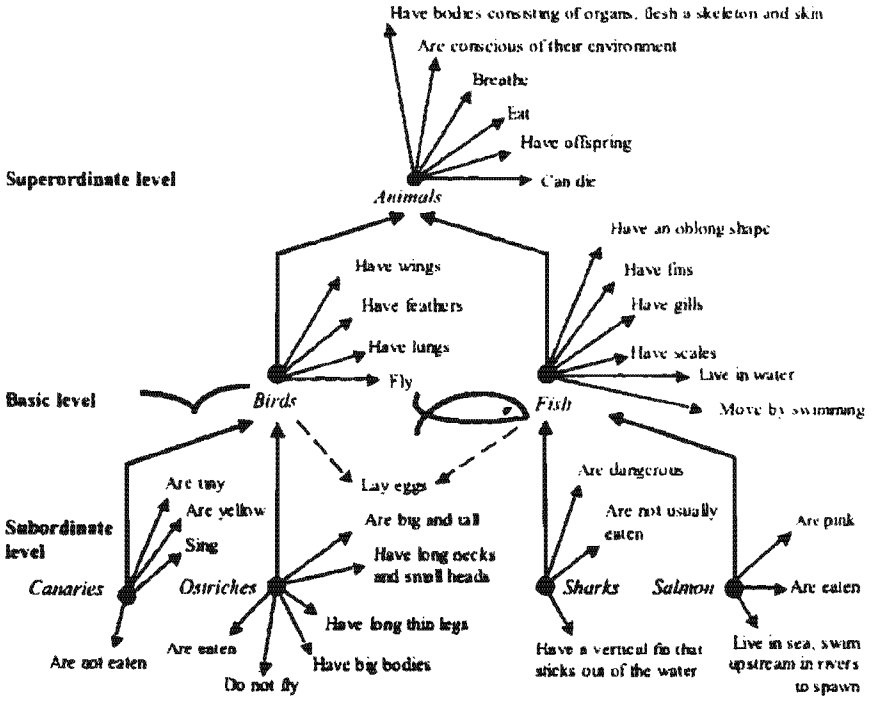

Figure 7: Categorising entities, based on their inherent and behavioural properties

- Superordinate level lexemes have a generic character that enables us to use them to make predictive generalisations during scientific descriptions.
- Demographic attribute contrasts like *female* x *male*, *adolescent* x *adult* and *urban* x *rural* usually form part of the superordinate level of conceptual categories.
- Basic lexemes are the ones used in everyday language. They usually form part of the core vocabulary of a language (the first 1000 or 2000 words) and there are relatively few other concepts conflated in their everyday meanings.

- Basic level lexemes are also used with a greater variety of meanings than superordinate and subordinate level words. They are the first words learnt by toddlers. Humans usually have visual and auditory gestalts for them.
- The gestalt nature of basic level lexemes enables us to make simple stick-like drawings of them (like the two slanting and converging lines that represent a flying bird, and the two lines and a dot that represent a fish in the Figure 7 above). Auditory gestalts allow us to imitate the sounds that things make (for example, a mouse *squeaks*, a snake *hisses* and a duck *quacks*).
- In addition, swearwords are usually basic level words while their scientific cognates are loan words from the classical languages, Latin and Greek, as in *cock* x *penis* and *shit* x *excrement*. All of this should alert one to the fact that one cannot make a precise scientific characterisation of phenomena by using mainly basic level words as descriptive terms.
- Subordinate level words, like *canary*, share all of the distinguishing attributes listed directly associated with them, like, *are small, are yellow, sing* and *are not eaten* plus all of the attributes that are above them on the taxonomy.
- Because bundles of attributes higher up on the taxonomy are summatively represented by words like *animal* and *bird*, one's brain subconsciously fills in the properties that are conflated in *animal* and *bird*.
- In subordinate level words like *ostrich*, *shark* and *salmon*, we usually conflate a larger number of descriptive concepts than in superordinate and basic level words. For the word *ostrich*, we for instance have to stipulate that it is *a big, flightless bird with long legs, a long neck and a relatively small head, that naturally occurs in arid regions of Southern Africa and that lays eggs as large as twenty four hen's eggs.*
- When one thinks and communicates about scientific or academic matters, one tends to use lexemes that are of a generic nature so that one can generalise one's conclusions as in, *adults more often suffer from technology fear than children*. One also tends to use subordinate level lexemes in phrases that are more complex so that one can be more specific in one's characterisations: *We have to distinguish between small and medium enterprises and informal enterprises. The*

former are part of the formal economic sector and are subject to the constraints of long-term planning. The latter do not form part of the formal economic sector and are characterised by the impulsive, unmotivated abandonment of one set of survival strategies for another set of untested survival strategies.

To summarise, what one knows is the sum total of all hierarchically associated concepts in one's mind. These concepts are organised into vast categorical domains of knowledge, such as forms of transport, types of food, dangerous animals and types of clothing. In each domain of knowledge, we subcategorise concepts into further sub-domains in terms of the number of properties that entities share. When we communicate our ideas about our concepts, we conflate those concepts into words and subsequently organise them into hierarchical patterns that we call sentences.

Role

Fauconnier and Turner's theory incorporates the theory of role relationships. According to this theory, thinking about events involves participant role relationships (who does what to whom with what), place (where) and time (when), to form image schematic patterns as set out below:

- Concepts like AGENT AND PATIENT, EXPERIENCER AND STIMULUS, BE, MOVE, REST, CAUSE, SOURCE, PATH, DESTINATION and CONTAINER are combined image-schematically to represent events.
- Particular sentences are perceived to be similar because they share generic image-schematic structure.
- By this account sentences like *The baby crawled into the closet, The car drove into the garage, The students sauntered into the lecture hall* and *The snake slithered into the crevice* all share the same image schematic elements in the generic space.
- These generic elements of meaning are combined to form the common event structure AN AGENT VOLITIONALLY MOVES ALONG A PATH INTO A CONTAINER.

Neurophysiologists like Edelman (1989 & 1992) and Calvin (1996b) consider the theory of image schemas to present a plausible account for the symbolic nature of human thought. I quote three paragraphs from the account given by Calvin regarding the crucial role that image-schemas play in cognition in general and in grammar in particular:

> Underlying our vast network of interrelated literal meanings (all of those words about objects and actions) are those imaginative structures of understanding such as schema and metaphor, such as the mental imagery that allows us to extrapolate a path, or zoom in on one part of the whole, or zoom out until the trees merge into a forest...
>
> Schemas are often about one thing relative to another. They include the little words of grammar – only a few dozen in number – that position things or events relative to each other on a mental map: relative location (above, below, in, on, at by, next to), relative direction (to, from, through, left, right, up, down), relative time (before, after, while, and the various indicators of tense such as –ed), relative number (many, few, some, the –s of plurality), relative possibility (can, may, might), relative contingency (unless, although, until, because), possession (of, the possessive version of –s, have), agency (by), purpose (for), necessity (must, have to), obligation (should, ought to), existence (be), nonexistence (no, none, not, un-), and more.
>
> Other common schemas are blockage, center-periphery, full-empty, more-less, near-far, splitting, attraction, balance, matching, removing a restraint, attracts, circles, part-whole, and the easy to misuse containment. Note that schemas tend to refer to movement, rather than static properties (they're often structures of an activity, not attributes of an object such as wet or cold). Even more than abstracts, schemas are flexible enough to fit many similar situations with differing details (Calvin 1996a: Chapter 10).

Image Schematic Role Relationships

In this section, I discuss a number of prototypical role relationships that constantly reoccur in scenarios and which could therefore be taken as forming part of the constitutive principles of sentence formation. In cognitive linguistics, image schemas are considered pre-linguistic sensory images that largely exist below the level of conscious awareness. Image schemas are

considered cognitive structures that arise from universal aspects of human morphology. Image schemas arise from how the human body interacts with our three-dimensional environment. They have a physical basis because we are upright beings with visual, auditory and olfactory senses that favour sensations coming from in front of us, as well as a social basis because we co-exist in human communities. Image schemas are the same for everyone, regardless of the language a person speaks.

The Being Schema

An object exists/ is situated somewhere in three-dimensional space:

- *The vase is on the table.*
- *Your clothes are in the wardrobe.*
- *Help me look for my car keys. They must be somewhere.*

The Happen Schema

A passive entity (patient) is involved in some process:

- *The tap* (patient) *is leaking.*
- *The water* (patient) *is boiling.*
- *The children* (patient) *are sleeping.*
- *The vase* (patient) *gleams in the moonlight coming in through the window.*
- *The curtains* (patient) *are blowing about in the wind.*

The Do Schema

An active entity (agent) is performing some sort of an activity that causes some effect to her/himself:

- *John* (agent) *is out jogging.*
- *Jamie* (agent) *is studying.*

- *He* (agent) *went sailing early this morning.*
- *Jack* (agent) *cycles to work every morning.*
- *They* (agents) *went hiking in the mountains* (separately).

The Agent Dominates Patient Schema

An active participant (agent) is dominating a passive participant (patient) through some action, with or without an instrument, by supplying the energy for the action, controlling the course of the action and causing some effect to the passive participant through the action:

- *The doctor* (agent) *operated on the patient* (patient).
- *The dog* (agent) *chased the cat* (patient).
- *The woman* (agent) *folded the cream* (patient) *into the batter* (patient) *with a whisk* (instrument).
- *Sam* (agent) *ate all the bagels* (patient).
- *John* (agent) *stole stamps* (possession) *worth $400* (possession) *from Pete* (patient).

Klopper 1999 proposed that the thematic role, agent can be further specified as being a co-agent in cooperative event scenarios, or as being a counter-agent in competitive or confrontational event scenarios. In a cooperative event, role pairs like agent and patient could be realised as co-agents as in *The boy* (co-agent) *helped his father* (co-agent) *carry the box up the stairs* in cooperative events, or as counteragents in competitive or confrontational events as in *John and Jane* (counteragents) *played chess*, or *The two boys* (counteragents) *are beating one another with sticks.*

The Co-Agents Cooperate Schema

Two or more participants are actively cooperating with one another to achieve a mutually beneficial objective:

- *Sue and Jane* (co-agents) *are planning the party*

- *The boy* (co-agent) *is helping his father* (co-agent) *carry the table up the stairs*
- *John* (co-agent) *sold his stamps* (possession) *to Pete* (co-agent) *for $400* (possession)
- *They* (co-agents) *went hiking in the mountains* (together)

The Counteragents Compete Schema

Two or more participants are actively competing with one another, or acting in confrontation with one another to achieve a mutually beneficial objective:

- *Sue and Jane* (counter-agents) *are arguing about the party*
- *The boy* (counter-agent) *is fending off his attacker* (counter-agent) *with a stick* (instrument)

The Stimulus Stimulates Experiencer Schema

An entity that operates on one's senses evokes some sensation in an experiencer:

- *The chattering monkeys in the trees* (stimulus) *drove the dogs crazy* (experiencer)
- *Somersaulting* (stimulus) *disoriented the boy* (experiencer)
- *Children* (experiencer) *hate cabbage* (stimulus)
- *The rookie* (experiencer) *hurled when he saw the beheaded corpse* (stimulus)

The being, doing and happening schemas present relatively mundane, background scenarios, used to set the scene for the more interesting interactions that involve agents and patients co-agents and counteragents, experiencers and stimuli. We use the being schema to simply situate entities in time and space. We use the happen schema to portray passive processes. We use the do schema to portray individuals engaged in activities on their own. We use the agency schemas to portray external human interactions and

the stimulus and experiencer schema to portray what psychological effects external stimuli have on experiencers' mind states.

Because humans are gregarious, we have an anthropocentric perspective of our environment. We mostly take for granted the time and place of events, and the instruments that we use, and often leave them out of sentences—the most basic mini-stories that we tell one another. We populate our sentences, and the narratives that we weave by combining sentences, with types of agents and patients that we construe as heroes, villains and victims. In sentences agents, patients, stimuli and experiencers are obligatory roles, while it is optional to stipulate instruments, time and place, as in *He sliced the cake (in the kitchen) (with a knife).* Instruments can be foregrounded by using them in theme position at the head of sentences, as in *the dog fetches the paper every morning*, which becomes *every morning the dog fetches the paper.* Similarly, instruments can be foregrounded by using them in the theme position, as in *he killed his opponent with this dagger* which becomes *with this dagger he killed his opponent.* Instruments can also be foregrounded by reconceptualising them as agents, as in *this dagger killed his opponent.*

Finally, the schema that interrelates stimulus and experiencer is fundamental to cognition and to the interpretation of the narratives that we tell one another. Whenever we try to make sense of what we observe around us, or interpret what others are communicating to us, we are experiencers, subject to stimuli that influence our perceptions and conceptions through our senses.

Blending and Optimality Theory

Fauconnier and Turner state that their theory of conceptual blending also incorporates *optimality theory* (OT). This theory can be traced back to Prince and Smolensky 1993, which introduced OT in the domain of phonology as an alternate framework of linguistic analysis to the rule-based theory of generative grammar. Within phonology, OT has largely supplanted rule-based frameworks (Gibson et al. 1994; Itô et al 1995; Boursma 1998; Hale & Rice 1998). It has also been extended to syntax (Bresnan 2000; Bresnan & Aissen 2001 and semantics Blutner 1998, 2000; Anttila & Fong 2000), but its use is not yet as widely accepted as in phonological analysis.

According to the MIT Encyclopedia of Cognitive Science 2003, optimality is a theory of linguistic universals and universal grammar. This theory posits that the grammars of all human languages share a set of *very general pre-linguistic universal constraints*, denoted by the abbreviation *Con.*

These constraints are sufficiently simple and general that they would conflict in many specific contexts if they were all to operate at the same time.

The grammar of any specific language resolves these potential conflicts by ranking the universal constraints of *Con* into a *constraint hierarchy* in which higher-ranking constraints could neutralise lower-ranking ones in cases where competing language forms are in conflict. Particular languages have characteristic features because they rank the universal constraints differently from other languages.

It is possible to compute the typology of all possible human languages[1] as the result of all possible rankings of these constraints. An OT analysis explains why some grammatical patterns are possible in a particular language while others are not.

With regard to the process of constraint ranking Bresnan and Aissen (2001) describe OT as a *combinatorial engine*, a universal language generator[2] of all possible linguistic structures whose output is not in the forms of particular languages, and not even bound to the overall typological space of natural languages[3]. This hypothetical language generator merely provides a common vocabulary for precisely describing all kinds of linguistic structures, natural and synthetic, for any given linguistic content. Which of these generated structures are selected as the outputs of particular grammars is determined by the relative strength of very general but violable hierarchy of constraints external to the universal language generator, but specific to particular languages.

For particular languages the proponents of OT posit a four-component linguistic system consisting of 1 underlying representations; 2 grammatical rules; 3 competing surface representations; and 4 a hierarchic system of constraints that regulate interpretation violations as basis for selecting particular surface representations. The basic idea of OT is that, as part of natural variation within the language of individual speakers, competing language forms are regulated (optimised) by an array of hierarchic constraints that become progressively more general and powerful. This entails that higher

[1] This is the case also for languages that do not exist anymore, or that do not yet exist.

[2] Abbreviated as GEN in OT literature.

[3] This point of view implies that the algorithmic principles on which optimality is based would also be able to generate non-human communication codes.

level generic constraints can neutralise lower level constraints that are more specific as part of the optimisation process. For instance, where generative phonology would require a set of autonomous rules to regulate the use of the English plural morpheme –s which is pronounced voiced in some words, but unvoiced in others e.g. *bags* [bægz] vs. *cats* [kæts], a single higher level optimality constraint allows the plural morpheme –s to be voiced after a voiced stop consonant like [g] and to be unvoiced after a voiceless stop consonant like [t].

Fauconnier and Turner (2002:311) state that because the governing principles of conceptual integration networks 'characterize strategies for optimizing emergent structure ... such ... principles are called "optimality" principles'. They add, 'governing principles also frequently compete with each other'. Fauconnier and Turner (2002:321) state that 'the principles for compression are optimality principles because they compete among themselves and with other principles and goals'.

Klopper (2002) relates optimality to the evolution of communication systems to accommodate increasing cultural complexity:

> Humans optimise a variety of forms of communication within a culture, and between cultures, to ensure immediate direct personal survival and to maintain their culture as a long-term indirect survival strategy.

The theory of the optimisation of human communication (TOHC) has the following corollaries:

1. On the principle of economy, no culture will evolve a system of communication that is more complex than is required for optimal communication within or between cultures.

2. Human communication and interaction contain *indexical* features as evidenced in verbal and nonverbal communication codes (such as gestures, facial expressions, locomotion, posture) that are directly grounded in actual instances of communication, and *symbolic* features that, as codes, first relate to one another in complex hierarchical patterns (such as phonemes, or written symbols, that are combined to serve as symbolic labels for conflated concepts in the form of

morphemes and lexemes[4], which in turn are combined according to predictable patterns to form sentences that can be used to refer to actual events[5]). Only in semiosis related to other symbolic elements in the human communication codes, can any subset of codes be used to refer to entities in the human environment.

3. Specific instances of communication can be ordered along a compliance-gaining continuum that progresses from *cooperation* to *competition* to *confrontation*.
4. New forms of communication will from time to time emerge in a culture to give expression to the increasing complexification of that culture.
5. When new forms of communication emerge in a culture they never supplant existing forms, but instead absorb and relativise[6] them as part of the new more extensive communication processes.
6. Humans use newly emerged forms of communication as survival strategies to innovate existing domains of knowledge of their culture and to create new domains of knowledge.
7. As a form of communication matures, it becomes ubiquitous.
8. Older forms of communication are employed more ubiquitously than newer ones.
9. Communicators employ ubiquitous forms of communication subconsciously.

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[4] The concept CAT is symbolically represented by the English phonemes (distinctive speech sounds) [k][æ][t] or their written letter equivalents *cat*. These combinations of sounds and letters serve as symbolic labels for the conflated concepts {ADULT, FOUR-FOOTED, HAIRY, PREDATORY, FELINE, ANIMAL}. Only in combination can these symbolic features be used to constitute the lexeme 'cat'.

[5] The lexeme 'cat' can be used in the role of AGENT along with 'mouse' in a PATIENT role in the sentence *The cat is chasing the mouse* which is built up according to a specific hierarchic pattern, represented by labelled brackets in [Sentence [Subject Noun Phrase, AGENT the cat] [Verb Phrase [Transitive Verb is chasing] [Object Noun Phrase PATIENT the mouse]].

[6] By relativisation of forms of communication, existing forms of communication are assigned new functional roles relative to newly emerged ones.

10. Existing forms of communication could be simplified in response to catastrophic stressors that impact a culture.
11. Basic as well as simplified forms of communication could become more complex under the influence and in the direction of more complex forms of communication during cross-cultural contact if the users of the more basic forms of communication perceive a communication advantage in emulating the forms of communication of the more sophisticated culture.

While the above-mentioned aspects of optimisation relate to the evolution of culture and communication for survival sake, Fauconnier and Turner relate optimality to competition of mental resources during cognition. Applied to conceptual blending, optimality entails that in the case of ambiguous expressions, and other types of expressions with more than one potential meaning, the potential interpretations are competing with one another as possible solutions to resolving ambiguities. One example of such competing interpretations is in the realm of counterfactual expressions.

Counterfactuality and Conceptual Blending

The term *counterfactuality* refers to reasoning used to conceptualise two alternate future scenarios between which one must choose. The following types of statement all contain that prompt for counterfactual blending by choosing between alternate scenarios:

- Conditionals like: *if (only), if I were you, if you ask me, unless, maybe, perhaps, rather not,*
- Modals like: *will, would; can, could; shall, should; may, might; must, have to;*
- Infinitives like: *running (causes) ..., sleep deprivation (leads to) ...* and *eating bran is ... for you;*
- Compound nominals like: *child-safe beach, ovenproof dish* and *gut wrenching accident scene.*

For example, *if I knew you were in town, I would have come to see you earlier* prompts one to envisage two alternate scenarios, one where you

knew something and acted on that knowledge, and a second scenario where you did not know something and consequently did not act. Similarly, *he can easily bend that pipe* prompts for a scenario where the pipe is bent, alongside a scenario where the pipe isn't bent. A person asking, *are you cooking the pie in an ovenproof dish?* envisages alternate scenarios where the dish has been shattered by the heat of the oven, alongside a scenario where the dish isn't shattered.

Fauconnier and Turner (2002: 230f) defines counterfactuals as follows:

> In this book, we use "counterfactual" to mean that one space has forced incompatibility with respect to another. But there is a narrower and more common use of the term to mean that one space has forced incompatibility with respect to a space we take to be 'actual'.

The implication of Fauconnier and Turner's statement is that, while one may prefer a particular interpretation (one did not know someone was in town, one has not been deprived of sleep, the beach is safe for children), one must keep in mind the possibility that the competing alternate scenario may be realised.

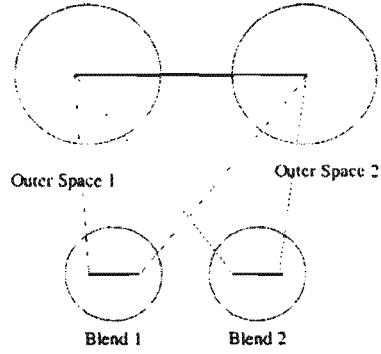

Figure 8: Counterfactual blends project alternate blended spaces from the same input spaces

Counterfactual blends are instances of blending where vital relations are selectively compressed and projected to two alternate blended inner spaces, rendering alternate interpretations as shown in Figure 8. Counterfactual blends are common in the domain of humour as can be seen in the following pair of "Chinese" proverbs as instances of ethnic stereotyping:

> Man who run in front of car get tyred.
> Man who run behind car get exhausted.

Moodley and Klopper (2003)[7] argue that when one ethnically stereotypes an individual you relate her/him to overemphasised group attributes in a cognitive process that always invokes emotions and involves value judgements. By extension, when one stereotypes an ethnic group like the Chinese, as in the case of the before-mentioned two proverbs, you overemphasise some attribute of the group's appearance, speech, body language or way of dressing, etc.

In the case of the two "Chinese" proverbs, a comical effect is achieved by linguistic means, through the deletion of the indefinite pronouns *a*, the deletion of the third person singular congruency marker *–s* in *runs* and *gets*, and the misspelling of *tires*. In this context, *man ... get tyred* is open to two interpretations, namely the man has consumed all his available energy, and the man is ridden over by a car. Once a frame for bodily harm has been established for the first proverb, *exhausted* in the second proverb, although spelt correctly, obtains the dual meanings of having consumed all available energy and suffocating from the car's exhaust fumes.

Such dual scope blends are characteristic of jokes, puns, riddles and parables, all of which evoke emotions in the experiencers, and all of which involve value judgements.

The metaphor cluster, *Yesterday is another country ... no one has a passport back there*

The metaphor, *yesterday is another country,* entails two quite mundane scenarios from the being schema, namely that time passes and that place exists. Vital relations relating to place, the more readily understood scenario, are selectively projected into the blend, *time is place* as shown in Figure 9.

This blend activates a belief framework that enables one to reconceptualise time as a counterfactual three-dimensional landscape with the properties height, width and depth. This is a landscape that one could enter, where one may have to move over, underneath and around obstacles, and above all, a landscape where one could encounter three-dimensional beings, as in the scenario, *no one has a passport back there.* A schematic representation of the topography of the extended metaphor is given in Figure 10.

The activation of the *time is place* belief framework enables one to extend the basic and relatively mundane generic metaphor *yesterday is*

[7] Published earlier in the same issue as this article.

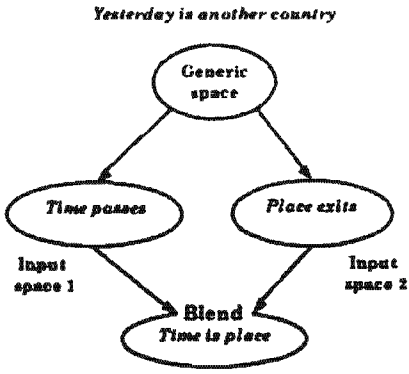

Figure 9: Topography of the metaphor, *Yesterday is another country*

another country, to a more detailed and interesting metaphor, *no one has a passport back there*, which is populated by human beings.

The indefinite pronoun *no one* is a conceptual trigger that populates the lifeless *time is place* landscape with human beings. Potentially, there are all kinds of human, just none with passports to a particular destination. The noun *passport* by inference populates the metaphoric landscape with travellers, authorities that issue passports, and control agents that permit and restrict access to regions of the landscape, based on permissions granted by the authorities.

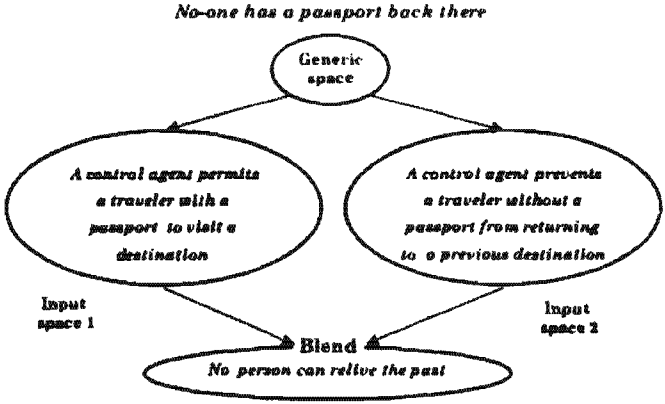

Figure 10: Topography of the metaphor, *No-one has a passport back there*

Interpretation is informed by the words of the metaphor cluster, but co-determined by one's prior knowledge. The metaphor cluster, *yesterday is another country ... no one has a passport back there*, is bound to make some

people think of the law of entropy, also known as the arrow of time. According to this law, in a universe governed by the cause and effect laws that hold for our universe, events only take place in the present, and events only proceed from a more organised to a less organised state. Bringing the law of entropy to bear on this metaphor cluster, leads to three conclusions:

1. One can only experience events in one's present;
2. One can envisage future events;
3. One can remember, but not re-experience events that have already taken place.

As is the case with most instructive narratives, this metaphor cluster also has a moral to it: *Do not let memories of past events and habits determine how you live in the present, including how you plan your future.*

General Conclusions

In this article, I analysed the metaphor cluster, *yesterday is another country ... no one has a passport back there,* against the theoretical background of Fauconnier and Turner's theory of conceptual blending. I showed that Fauconnier and Turner posited a neurophysiological basis for how concepts are extracted to a generic mental space and selectively projected to at least two input spaces from where they are compressed and projected into the blended space to form new inferences.

I showed that prominent neurophysiologists like Edelman and Calvin also foresee a neurophysiological basis for the formation of image schemas, mental imagery and metaphoric thought. I discussed and elaborated on the vital relations that Fauconnier and Turner identified as crucial components of their theory and showed, by way of illustration, how humans commonly stretch and compress temporal relations to achieve human scale thinking.

I showed that emotion is intimately involved in the process of long-term memory formation, and subsequently in the retrieval of long-term memories to working memory during conceptual blending.

I presented the theory of role relationships in considerable detail because, although it is crucial to an understanding of the theory of conceptual blending, Fauconnier and Turner assume prior knowledge of it. I discussed counterfactuals as blends that relate to humour, jokes, puns, riddles and

parables, and finally, I analysed the metaphor cluster, *yesterday is another country ... no one has a passport back there,* as an instance of conceptual blending.

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