

Addressing Tipping Points for a Precarious Future

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Skittles

The Story of the Tipping Point Metaphor and its Relation to new Realities

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[-] Abstract and Keywords

Tipping points are set in complex systems. To make sense of them requires metaphor and narrative. Metaphor is a useful supplement to scientific enquiry, offering a different type of future-orientated knowledge that can provide a fresh perspective for reaction and accommodation. Metaphors allow for new ways of interpreting scientific prediction and construct, as science itself uses metaphors, so aiding the developing present, by redefining past circumstances for possible adaptive futures. Metaphors can liberate but they can also obstruct: they can communicate and they can trample. The key is to combine the freedom of thought with interdisciplinarity and flexibility of analysis. Metaphors also encourage narrative options and contingencies, thereby enabling a range of interpretative pathways for bifurcated futures.

Keywords: tipping points, metaphor, metonymy, complexity, narrative

Let us assume, for the context of the present discussion, a situation in which 'global coordination for sustainable outcomes is needed to an extent that existing institutions are clearly unable to provide' (Foden 2009: 1). This would not necessarily mean that we need new institutions - but it would at least mean that existing institutions must find novel ways to disengage from linear, 'locked-in' modes of thinking. The proposed challenge is genuinely multidimensional and definitively transdisciplinary. It involves from the outset a need for clarity about who the 'we' is, and an accompanying effort of inclusion and flexibility. It would therefore seem likely that systems theory is a framework in which radical new approaches might be taken.

As it is now commonly encountered in models of complex systems, the metaphor of the tipping point seems a good place to begin a systems-based encounter with metaphor. Metaphor and its close cousin narrative can offer pathways to a higher-order management of complexity. This can aid decision-making, policy formulation, and communication. All this is already to hand: what lies further from our grasp, beckoning from times ahead, is a kind of benign tipping point for all,

a shift in global consciousness that will allow us to face the future with excitement and purpose. Inevitably that process will involve us separating ourselves mentally from those modes of thinking and habits of behaviour which have put us in abeyance as regards the world to come.

(p.50) A new paradigm

One of the functions of metaphor is to open up unmeasured domains and potential channels of action. This is necessary at a time when our models of the world and consequent plans for action are underdetermined by our scientific observations and overdetermined by our past experiences (Van der Leeuw 2004; Atlan 1992). We make policies on a deficit of knowledge, effectively seeding future crisis into socio-economic systems, with correlate damage to Earth systems.

Our current plight relates to global society's inability to process a wide range of signals, suggesting that multiple systems have either failed or are on the point of failure. We can see it happening, despite inadequate data, but we don't seem to be able to do anything. We appear paralysed by our modes of thought, as if viewing multiple images of ourselves in mirrored postures of rictus. One way out could involve a new engagement of science, technology, humanities, and the creative arts. This would begin by acknowledging both general indeterminacy and the particular interrelations of systems/groups, and then move forward to new states, through a linked understanding of relativity and metaphoricity. We need to design the future from a range of narrative options rather than accept it as it comes to us: metaphor gives us the frames with which to begin doing that.

Metaphor and science

At the very least, commitment to the study and practice of metaphor is a useful supplement to traditional scientific activity, offering a different type of future-oriented knowledge that can provide a platform for decisive action. The combinations of metaphor are anyway bound up with the semi-intuitive aspect of science as it relates to language and the unconscious. Metaphor is of a type with 'the combinations which present themselves to the mind in a kind of sudden illumination' identified by Poincaré (1914: 58), who was extremely alert to the mutual transformations of mathematical and verbal concepts, and how verbal analogies can stimulate both research and public understanding. (It was also Poincaré, of course, who developed the modern conceptions of stability on the foundations laid by the eighteenth-century mathematicians mentioned below.)

Long before publication of Malcolm Gladwell's (2000) famous book, the phrase 'tipping point' existed in interrelated areas of ecology and environmental **(p.51)** science. In these fields, tipping points often have the status of discretely understood academic and physical realities: they are 'literal', to use the appropriate linguistic term, rather than 'figurative'. Frequently these apparently non-metaphorical tipping points have already established different scientific understandings through discipline and paradigm, so that 'tipping point' *means* something different as well as *being* something different.

In general it appears that these scientific users are not, at least not consciously, committing the useful error of metaphoric expression. When encountering a word or phrase somewhat at odds with its expected conceptual context within a language system, interpreters seek out – through perceived resemblances between the tenor (underlying idea A) and vehicle (the metaphorical word or phrase B) of a metaphor – the perceived semantic intention (C), according to a particular discourse. As we will see, such interpretation is not without risk of failure: it is not necessarily a given that (C) is more easily or instantly grasped, or even that more creative communication is the underlying purpose of metaphors. Metaphor is creative in the sense that

fire is creative: it jumps from roof to roof, opening up new ground, and fresh arrays of positional information, according to how the burnt sticks fall.

Between conceptual context, discourse situation, and models of a language system in general, are various philosophical traps: each of those interrelated contextual domains is a shifting field of uncertainty.

Tripping, tumbling – tipping – into one of these traps and suddenly understanding the problem, otherwise well-intentioned scientists might find they had, in fact, been using metaphors without having realized they were doing so. It would be a specific instance of Jakobson's observation (1960: 356) that like Molière's M. Jourdain we all 'practice metalanguage without realizing the metalingual character of our operations'.

This recognition would be in the nature of a tipping point in itself, as the notionally solid footing of the phrase within a particular scientific discipline could then be impeached. And then, as if a line of marching soldiers were to trip in succession, the ankles of one having been entangled in the bolas of a guerrilla rhetorician, why not the next term and the next?

Yet as we will see, if metaphorical slippage is itself recalibrated as offering a visionary half-glimpse of quantum realities, what was a problem becomes a novel opportunity.

(p.52) What does metaphor do?

Metaphor offers a displacement of information: it dynamically makes other linguistic contexts present, subjecting the pre-existing understanding (A) to a shift or substitution (B), which process may summon a composite or third value (C) that asks to be observed and understood in turn. It is important to consider that while A and C operate over longer time series (forward and backwards in time – see Figure 3.1 below), B's union or equivalence with A is instantiated in a single transformative moment.¹ It is a kind of new beginning: a 'tipping point', as we may say, a place where or moment when new types of being are begun, born of the couplings of language in a particular context.

Metaphor's moment of conjecture ('throwing together') invites us on a voyage towards future conclusions, taking us on a new tack in the direction of other final states than those we might otherwise have envisaged. As Mason (1987: 245) has it, 'Metaphor gives us a new, unthought-for equation, an infusion of meaning from outside customary domains.'

For decision-makers, the appearance of these new potentialities within the bounds of conception implies at least an optional possibility of actualization. Whether the decision was not at all possible before (because the mental conditions for it had not been created until the conjecture had taken place) is an arguable philosophical point. The issue is bound up with ideas about time and the ways in which humanity deals with continuous and discrete phenomena. In open systems, tipping points remain a critical change but the separateness of the pre- and post-tip point moment is challenged: by feedback and feedforward issues, by activity at the edge of the system, by disappearances from it, and by the new values brought into being by the emergent situation. It is in these areas that our best hopes lie: by simultaneously inculcating a sense of a developing present,² revising past projections, and envisioning new possibilities, we can ourselves **(p.53)** become resilient. Elsewhere I consider some ways of addressing ourselves to that ideal practically (Foden 2010).

Metaphor plays a key role in what literature knows, as well as in its poetic effects. It is also something that users of language in general 'do' or 'perform', consciously or unconsciously. Rhetoric (traditionally the native ground of metaphor as a practice) provides language-based heuristics for various purposes, while in linguistics metaphorology is a distinct branch of objective study. From Aristotle to Hegel, to Derrida and beyond, philosophers of language have tried to grasp metaphor, either within a total rationale, or in passing while focused on other matters.

The slipperiest of fishes, metaphor won't be in fact governed by any one of these disciplines or types of activity. This is why systems theory is a good environment in which to think about it, though we should not be complacent about the ability of any discipline or practice to contain metaphor. Engaging with metaphors we leap across logical and hierarchical divisions, making category errors that overturn the authority structures embedded in linguistic and philosophical systems. As Paul de Man (1979: 10) suggests: 'Rhetoric radically suspends logic and opens up vertiginous possibilities of referential aberration.'

To see metaphor as a form of knowledge is to acknowledge its errant behaviour (broadly, its positing of A as B against contextual expectation) as useful. At the same time, we must equally acknowledge the unruliness of metaphor's transformative power. This is to recognize metaphor as 'the unsystemizable, transcendent centre of language' (Coetzee 1979: 28). The best we can hope for is that since metaphors summon their newly observed values from other contexts, these new values contain the possibility of greater social utility than that which obtained with old values. Of course, the reverse is also true: this is the secondary risk of metaphor, the first being that you simply are not understood (see the commentary by Matthew Taylor which follows).

There are no doubt complicated reasons in the social psyche for metaphor's double life as a communicative civil servant and a tramping outcast. The essential relation of metaphor to positional information (and 'context' in general) means that polarity just offered ($A = B$) can never be relied upon. Sometimes metaphors fail and then 'irony comes in to save the day when the world turns upside down on consciousness, when the old certainties become uncertainties, and there is no new standard to put in place of the old' (Mason 1987: 245).

(p.54) Interdisciplinary problems and opportunities

Many scientists, rightly seeking to be exact about phenomena, struggle with the concept that all language is subject to metaphoric slippage; yet to not believe so would come close to being a *trahison des clerics* in the humanities. At the same time, humanities people make little effort to make an accommodation with scientific models and methodologies about and around uncertainty, in particular those

system dynamics that have been generalized by advances in mathematical, scientific and technological research over the past 50 years, together with new approaches to the use of data and ICT.

(Hunt *et al.* 2012: 1)

Though the idea of mimesis is well developed in the humanities, it is not adequately linked with the scientific idea of a model: that needs to happen if a truly transdisciplinary moment is to occur.

There have, however, been a number of attempts to link systems theory with linguistics (such as Rogers 1987–88). There have also been significant attempts by creative writers to admit systems theory. Some of these are charted in Tom Leclair's groundbreaking *In the Loop: Don DeLillo and the Systems Novel* (Leclair 1988), one of few attempts to bring systems theory into literary hermeneutics.³

Scientific and humanities conceptions of uncertainty and indeterminacy need, in any large systems model, to be brought into yoked harness if a higher-order field of enquiry and decision-making is to be established. Part of this will involve further transfer to formal logic and mathematics of philosophical concepts. While that has long been a direction of some aspects of Anglo-American philosophy, it seems to have happened much less with the French and German philosophers whose work is concerned with, indeed is often based on, uncertainty and indeterminacy. This process would need to recognize the objection made by Coetzee (1979: 28) to 'any scheme that has recourse to analogy ... If rules are to be rules, they must be well-defined. The relation "to be like" must be defined.' (The occluded context of Coetzee's observation is the system of political apartheid in South Africa.)

(p.55) The idea of metaphors (and narratives) as vehicles across dimensionality and between groups or sets, in a mathematical sense and in the wider field of information processing, does not seem to have been adequately explored. It may in the future be possible to develop an ICT-enabled spatial (or topological) conceptualization of a lexicon that exploits the ability of metaphors to 'travel' across experiences that are usually demarcated. But as de Beaugrande observes:

the concept of 'dimensionality' is meaningful only if we assume that any particular observed value belongs within a range of alternative values of 'the same' dimension. In that sense, the observed value rests on the interference pattern of other possible values.

(de Beaugrande 1989: 23)

Nonetheless, as a subject for information processing (as something which offers instantaneous communication between cognitive categories or linguistic events), metaphor might helpfully be understood as an interference phenomenon on this basis, with the pattern developing from the new value-system that is in the process of emerging when metaphorization takes place.

The problem, of course, is that we don't know the limits and correlations of the emergent structure, so it is not fully logical or intelligible. But this is also the opportunity of metaphor as a pointing tool to orientate evolving structures.

Semantics, discourse analysis and related areas of the social sciences have evolved many useful modes of analysis that could act as a bridging mechanism between humanities and science, but these seem to be rarely deployed in the service of global systems science, despite the current importance placed on metaphor, narrative and communication in general by scientists and policymakers.

There is, however, some background for treating tipping points as metaphors with respect to an analogous discussion of the related term 'resilience' within the literature of adaptation within socio-environmental systems:

When applied to people and their environments, resilience is fundamentally a metaphor. With roots in the sciences of physics and mathematics, the term originally was used to describe the capacity of a material or system to return to equilibrium after a displacement. A resilient material, for example, bends and bounces back, rather than breaks, when stressed (Gordon 1978; Bodin and Wiman 2004). In physics, resilience is not a matter of how large the initial displacement is or even how severe the oscillations are but is more precisely **(p.56)** the speed with which homeostasis is achieved. The image is a compelling one, capable of sparking human imagination, as it clearly did for Holling (1973) in his original and influential thesis about 'ecological resilience'.

(Norris *et al.* 2008: 127)

The two terms, 'resilience' and 'tipping point', are extremely significant in current socio-environmental discourse, and that they come from the domain of physics (demonstrably so in the case of resilience, more tentatively with the tipping point phrase – see the quotation from Bernoulli below), should probably be being treated as significant information in itself, i.e. the figurative dimension of these words says something about the disciplines in which they are being used; and this should not really be that surprising at all, as linguistic developments are systemic signals just as valid as ocean temperature data.

For now, and for that reason, we will proceed on the basis that tipping points are both metaphors and physical realities, as if a convergence of discursive and physical systems has taken place, a collapse between the multidisciplinary usage of the term 'tipping point' in a major world language and the interdependent actualization of tipping points in different socio-environmental systems. If that is indeed the case, it would be an extremely worrying development.

Theories of metaphor

As is well known to humanities scholars, the origin of the word 'metaphor' in many European languages is the Greek *meta-pherein*, a carrying over from one realm to another, a 'transference'. The word relates to a wider conception of 'transport' deeply embedded in ancient Greek thought. This carrying over is more specifically defined as the transport of a linguistic entity from one category, discipline or paradigm to another. It relates to classical theories of groups, and in respect of the interference patterns mentioned above it is worth remarking that mathematical/physical and philosophical group theory comes from the same fundamental classical sources.

When a metaphor is made, a process of mapping takes place between literal and figurative. Already, however, in the notion of a map we see an example of metaphorical usage conditioning our everyday language. This conditioning explodes the dichotomy between literal and figurative on which more basic metaphor theory depends, which is one reason why the **(p.57)** simplistic appeal to analogy between A and B cannot be maintained philosophically.

Partly for this reason, the theory of metaphor has since classical times been one of the most contentious subjects in philosophy, literary criticism and linguistics. We cannot hope to cover all that bloody ground here but, arming ourselves with patience, we shall try to sow a few dragon's teeth that might spring up in the service of systems thinking generally, rather than fomenting disputes.

We might begin with understanding what class of concept metaphor is within rhetoric. While there have been many philosophical challenges to the classification, within literary study metaphor is commonly treated as an example of a 'trope' or 'figure' whereby there has been a divergence from a proper or literal use, thus also 'error', as in *err* (wander), an important concept in literary study.

There may well be a link to the systems idea of the non-linear or dynamic reaction in Bahti's well-founded observation that:

the general insistence on trope's and figure's divergence from a quasi-naturalistic or basic norm is apparently preserved in the terms themselves, trope being from the Gr. *tropein*, 'to turn', 'to swerve', figure from the Lat. *figura*, 'the made', 'the shaped'.

(Bahti 1993: 410)

This suggests that the preceding linguistic context constitutes a system input from which the emerging metaphor is the unpredicted output. The idea of trope is at base sensuous and organic while the opposite is true of *figura*, where the emphasis is on construction: the distinction is significant in metaphorology but little observed.

The most commonly deployed theory of metaphor, from Aristotle to Jakobson and beyond, through various modulations, involves a substitution. $A = B$, again (though of course the conditions are always different). Hitherto, this diachronic moment of substitution has been opposed, graphically and conceptually, with a related synchronic structure of signification: that is to say, the structure of metonymy in which concepts are either categorically related or contiguously linked by syntax.

In a famous paper concerned primarily to identify the empirical linguistic function of poetry, Jakobson (1960) argues that any utterance is a function of two axes: the metaphoric (the axis of selection/substitution) and the metonymic (the axis of combination). Communication takes place at the intersection of the axes, in a joint process (see Figure 3.1):

(p.58) The selection is produced on the base of equivalence, similarity and dissimilarity, synonymity and antonymity, while the combination, the buildup of the sequence, is based on contiguity. The poetic function projects the principle of equivalence from the axis of selection into the axis of combination.

(Jakobson 1960: 358)

(p.59) Figure 3.1 is a customized version of a graphic crux that has dominated the study of linguistics and literature, emphasizing (to put it in systems terms) the linearity of grammar and a language system and the non-linearity of metaphoric reference (and to a larger degree signification in general, for the conditioning reasons I have explained); all linguistic activity is involved with both axes. In linguistics and cultural study, as Jayne (2005) has concisely shown, this binarism originated with Saussure's 'axis of simultaneities' and 'axis of successions' within language, then rapidly propagated through twentieth-century thought in modulated and disputed forms. It is worth stressing again that the linearity of models of language systems is an idealization: in reality, of course, language-in-use reflects all manner of variations and fluctuations across time and space, which are flattened by models of language.

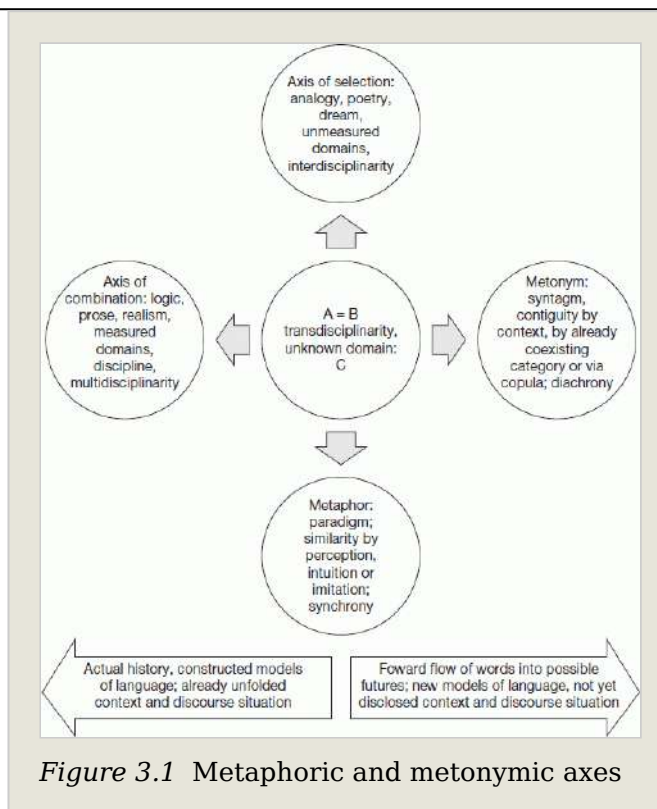


Figure 3.1 Metaphoric and metonymic axes

One key issue in these developments involves the direction of travel of information between the two axes, and the related choice of ground into which the projection of equivalence is made. As Barthes puts it:

Any metaphoric series is a syntagmatized paradigm, and any metonymy a syntagm which is frozen and absorbed in a system; in metaphor, selection becomes contiguity, and in metonymy contiguity becomes a field to select from. It therefore seems that it is always on the frontiers of the two planes that creation has a chance to occur.

(Barthes 1968: 88)

There are many related versions of this point in the semiotic literature and it clearly also relates to aspects of group theory and relativity in mathematics and physics; it is within this intersection that a sensible new space between the sciences and humanities might be opened up (see Favre *et al.* 1995). Derrida (1982: 207–71) explores the problematic play of metaphor across groups and categories from the perspective of philosophy and the wider humanities.

In this context it might be useful to think of the relationship between metaphor and metonymy as itself being a tipping point (see Figure 3.2). Of course, the diagram could equally be rearranged laterally, or with a different balance, and this is rather the point. There is a problem or (depending how you look at it) an opportunity of indeterminacy and perspective. For certain: one of the problems is the challenge this presents to the computation of language. To speculate: the opportunity could concern aspects of quantum computation. As de Beaugrande has it:

A willingness to acknowledge indeterminacy should allow us to gain a more determinate grasp of complex issues and of potential relations among them. **(p.60)**

Ideally, this result could greatly expand human perception by revealing the model character of quantum reality for numerous modes of access to classical reality. (de Beaugrande 1989: 46)

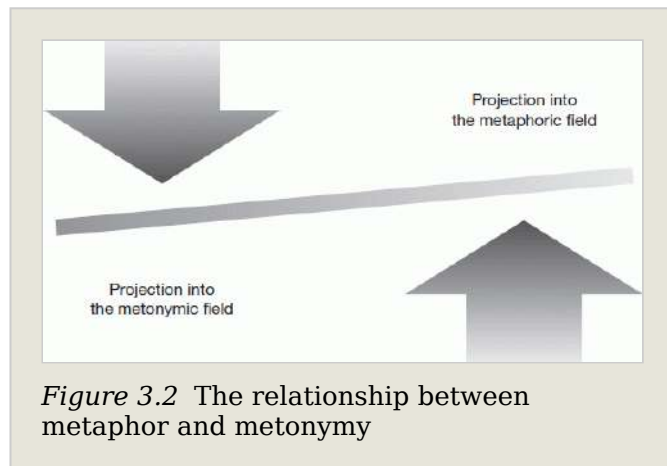


Figure 3.2 The relationship between metaphor and metonymy

Versions of the substitution theory of metaphor remain the method in working pedagogical use in most of the humanities. For many decades, however, those working in literary semantics and other areas on the margins of philosophy, as well as related groups working in cognitive psychology, have challenged substitution theory. Despite their differences, many of the other theories hold that:

rather than simply substituting one word for another, or comparing two things, metaphor invokes a transaction between words and things, after which words, things and thoughts are not quite the same. Metaphor, from these perspectives, is not a decorative figure, but a transformed literalism, meaning precisely what it says.

(Martin 1993: 761)

In this precision, we may say, the ground is prepared for a limited recovery from aberrance of metaphor, turning its propensity to induce a *mise en abîme* of signification into a useful capacity within systems science – as a vehicle for communicating information about inaugural states of affairs, systemic developments, or hypothetical conceptual relationships. We need to start thinking about other metaphors that shed light on the future arrangements implied by tipping points.

(p.61) Connecting all this with hard science is not easy. As we have discussed, the limitation arises because metaphoricity resists finite quantities and discrete categories. Derrida (1982: 219–29) demonstrates the paradoxical impossibility of total schematics for a metaphoricity of philosophy:

Each time that a rhetoric defines metaphor, not only is a philosophy implied, but also a conceptual network in which philosophy *itself* has been constituted. Moreover, each thread in this network forms a *turn*, or one might say a metaphor ... What is defined, therefore, is implied in the defining of the definition.

(Derrida 1982: 230)

It follows that an intrinsic metaphorology of any delimited domain of human experience is similarly circumscribed. In other words, the effective metaphoric intervention is always a paradigmatic intervention. Metaphor is, in terms of models of language, again itself a tipping

point, since the very idea of 'other words' always comes into play, along with challenges to the limits of underlying groups or sets.

Metaphor and complexity

The idea that metaphor teeters on a seesaw of intelligibility/unintelligibility is one of the links between metaphorology and complexity science. The complex system 'organizes within the space placed at the edge of chaos, where an activity arises that produces a maximal information processing' (Longa 2001: 5). In this way metaphors might be seen as both an approximation of chaos and as attractors which capture emergent aspects of the language system 'forcing it to abandon the territory of chaos thus entering into an ordered pattern' (Longa, 2001: 6). As Longa shows, the space of possibilities is not constrained by historical possibilities but by the attractors themselves. They constitute the informational conditions of the new situation.

None of this should deter scientists from listening, on a simple and practicable level, to their inner metaphor meter as they present their findings. The temptation or need to metaphorize is probably itself a signal that a paradigmatic shift is involved with their work and that some alteration of theory must be made to catch up with the new information. The rhetoric itself is part of that information, projecting itself on to the grammar of the ostensibly scientific work as a kind of feedback effect.

(p.62) 'Catching up with the new information' - this is rather in the nature of dynamical systems, both in their interpretation and in terms of the systems themselves, as they process information. As Hunt *et al.* (2012) reveal, a mismatch between the speed at which a system operates and the speed at which it processes information is often the cause of crisis.

Martin (1993: 762) points out, citing Brooke-Rose (1958), that verbal forms of metaphor ('the dying year'; 'the tipping point') are more common than 'the nominal "A is B" equation'. In systems terms, the use of the verbal form would equate to the dynamical aspects of non-linearity, and a wider sense that something unpredictable is in the process of happening, that may or may not involve a typological change or contextual turbulence.

Richards's (1936) idea of metaphor as a 'transaction between contexts' was developed by others to draw out the idea of an apparent contradiction which causes us to seek out an emergent meaning. Black's (1962) interaction theory distinguished the *frame* (the verbal unit in which a metaphor occurs) and the *focus* of a metaphor (the figurative expression itself), with the focus bringing into being a 'system of associated commonplaces' that 'interacts with its frame to produce implications that can be shared by a speech community' (Martin 1993: 764).

Metaphor as risk

The risk of metaphor, and it is the risk currently being run by users of the tipping point metaphor in the context of Earth systems, is that these implications are not understood or acted upon. As well as within systems theory, it might be possible to consider metaphor within a framework of risk, but for the time being we shall keep within the domain of linguistics (not least because ideas about risk differ radically across different disciplines and practices).

In their seminal paper, Nair *et al.* (1988: 20-40) explore metaphor with reference to the notions that (1) 'metaphor can usefully be seen as a kind of risk-taking in the interests of richer interpersonal communication (hence a risk with rewards)'; and (2) that there is the possibility of a 'cline of metaphoricity associated by speakers with items in the lexicon'.

To expand, the implication of the second point is that makers and interpreters of metaphors construe what is normal in context-determined language-in-use (rather than simply the lexicon) and discern degrees of anomalous difference away from that as they create and interpret metaphors:

(p.63) This could be cast as a continuum with familiar standard language use at one end of the scale and the nearly indecipherable at the other end. Between these two poles lies the usage we are interested in, involving degrees of individual and creative risk-taking.

(Nair *et al.* 1988: 35)

As these authors recognize, understanding of these clines of difference is fraught with problems, because of context dependence and other questions. However, their most important point for our purposes relates to their speculation that there is a 'roughly delimitable set of core, productive and culturally salient vocabulary items that predominate in conventional and creative metaphors'. These are the frames the past is built upon; somehow they must also serve as the foundations, the good Earth, for the new core metaphors of the future.

With core metaphors, the metaphor has become so embedded and widespread in particular cultural formations across time that the meta-phorized concept itself shapes discourse and thought, for example, 'life is a journey', 'argument is war'. The definitive statement on this is the work of Lakoff and Johnson (1978), though there have been many advances since. It is possible that the widespread use of tipping point across disciplines indicates its adoption as a core metaphor.

Tipping: an emergent core metaphor?

The set of core metaphors derives from basic-level concepts: that is, 'the most vividly grasped, most discriminable, most usefully differentiated items in our taxonomies' where instances of a category are judged to have many attributes in common (i.e. wings and feathers but rarely fur in birds). The suggestion is that the commonest, most effective, most rewarding metaphors are those which project an equivalence of attributes from one set to another and that that projection is understood and absorbed by interpreters. These metaphors then become extended by analogy and become institutionalized.

Whether this means we are now to take 'tipping' as an emergent basic-level concept across multiple systems is a speculation too far, but it is certainly the case that 'tipping point' is a phrase being used across a very wide range of instances, and within certain disciplines it is institutionalized. That multi-projection of tipping attributes across different domains is in itself significant.

(p.64) Metaphor and separation

'It is quite true what philosophy says; that life must be understood backwards. But then one forgets the other principle: that it must be lived forwards.' Kierkegaard's conundrum (1966 [1843]: 63, 161) invites us to apply a folk form of Bayesian probability as a way of dealing with tipping point problems, in that to face them we must actively reconsider the fixities of our previous beliefs in the light of new data and new needs. Metaphor can help memory in this work. There is a long tradition in European philosophy whereby the relative roles of dialectic and metaphor, in consciousness and in culture generally, offer a revivifying new connection based on a recollection of (and therefore separation from) previous states of being. Chief arbiter of this

tradition is Hegel who integrated these dual processes in the structure of his *Phenomenology*. As Jeffrey Mason writes:

The employment, supercession and transformation of metaphors in the *Phenomenology* are part of a rhetorical strategy of recollection. The way consciousness moves through its permutations is based on need and lack. That need and lack in turn depend on the recognition of their existence by consciousness. And that recognition itself depends upon recollection. Only when consciousness can say 'that is what I was, but I am no longer it' has it moved beyond its former position. The dialectic is the liberation of consciousness from its own creations, its images and pictures.

(Mason 1987: 245)

Mason's characterization of metaphors as 'the stepping stones of speculative thought, which never stops on any one stone but without them could not move' (1987: 247) is itself a useful metaphor with which to progress to the next stage of my own argument, which concerns the relation of metaphors to the body and, by extension, all the living systems currently under threat.

Metaphor and the sensuous

To recollect the brief and incomplete survey of metaphorology above, which left unsaid the recognition that much else has been said on the topic, one must also consider the relation of metaphors to living things.

It has become a commonplace in systems circles to think of narratives, metaphors and models (in the sense of computer models) as idealized representations of experience. But the direction of some key metaphors (**p.65**) (and the metaphor of the key might be one of them, being to hand) seems to be explicitly anti-idealist, sending us back in the direction of the sensuous body. Fusion theorists within linguistics argue that metaphors unify the sensual and the conceptual and/or the concrete and the abstract in a single universal. This surely relates to the appeal of the tipping point metaphor across multiple disciplines, within a total concept of Earth and socio-economic systems. From the side of the philosophers, Nowell-Smith shows,⁴ Heidegger's view is that metaphor's transference is dependent on division of sensuous and non-sensuous realms. The best metaphors bear back on the body, and the forbidding power of 'tipping point' as a phrase is that it seems to ask: is it me, or is it my body, that is falling?

The etymology of the tipping point metaphor

When we try to understand what that means - is it me that is tipping? - the differentiations of social and national groups come into play,⁵ as does the historical usage of the tipping point phrase. Employment of the phrase carries through a whole host of meanings from previous usage.

As Lang and Ingram observe in Chapter 4.1, the phrase was itself tipped into mass usage by the publication of Malcolm Gladwell's book, *The Tipping Point: How Little Things Make a Big Difference* (2000), which sought to explain sudden changes, dramatizing tipping point narratives over a range of disciplines and paradigms. While the original scientific usage on which Gladwell largely draws is actually from the world of epidemiology, the current popular definition (and the only definition in the *Oxford English Dictionary*) is:

The prevalence of a social phenomenon sufficient to set in motion a process of rapid change; the moment when such a change begins to occur.

(p.66) This definition is likely to be a consequence of the popularity of Gladwell's book and does not reflect a wider diversity of uses in academic discourse. Its first recorded emergence in the context of urban racial balance seems to have been in *Scientific American* in 1957:

White residents who will tolerate a few Negroes as neighbors ... begin to move out when the proportion of Negroes in the neighborhood or apartment building passes a certain critical point. This 'tip point' varies from city to city and from neighborhood to neighborhood.

Instinctively, this seems wrong as a base origin for tipping points. The source is much more likely to be concrete, embedded in everyday life (see 'Skittles' below), and intellectually related to the history of the physics of stability. For example we can hear the emergent tipping point rhetoric in this 1738 quotation from Bernoulli:

a minimal arbitrary force makes a body - although put in firm equilibrium - nod a little, but when the force has been undergone [i.e. ceases to act], the body tends again to its natural position, unless the nodding would have exceeded certain bounds.

(Bernoulli 1738: 148, cited in Leine 2009: 175)

Investigation shows that across all its senses the origins of tip and those words with which they seem likely to be cognate are obscure. However, we can identify the following verbal forms for tip in these edited and adapted extracts from the historical thesaurus of the OED:

Verb form 1 [V1]

- a. To strike or hit smartly but lightly; to give a slight blow, knock, or touch to; to tap noiselessly.

[The remainder of the entries for V1 need not delay us further.]

Verb form 2 [V2]

Transitive senses:

- a. To overthrow, knock, or cast down, cause to fall or tumble; to overturn, upset; to throw down by effort or accidentally.
- b. Skittles. In the older game, said of a pin. To knock down another skittle by falling or rolling against it, as distinguished from the direct action of the bowl. 1801: 'In playing at skittles, there is a double exertion; one by bowling, and the other by tipping.' [This meaning seems highly relevant to the interaction of tipping points across different systems. Though one is only asserting rather than proving this, it feels as if skittles might be the genuine origin of tipping point as a phrase, sometime in the mid-to-late 1700s, coming at roughly the same period as physicists such as Bernoulli, **(p.67)** Euler and Lagrange were working out the effect of small disturbances on stability (see Leine 2009).]
- c. To cause to assume a slanting or sloping position; to raise, push, or move into such a position; to incline, tilt.

d. **to tip the scales**: to tilt or depress the scale of a balance by excess of weight; to turn the scale.

e. **to tip one's hand**: to disclose one's intentions inadvertently. 1979: 'Mr Hunt will not tip his hand on the price at which he will buy more bullion.' [This meaning probably comes from card play.]

f. To empty out (a wagon, cart, truck, or the like, or its contents) by tilting it up; to dump.

g. To dispose of or kill (a person). 1928: 'Jake's sort o' done me a good turn, getting himself tipped off.'

Intransitive senses:

a. To be overthrown, to fall.

b. To fall by overbalancing; to be overturned or upset; to tumble or topple over.

c. To assume a slanting or sloping position; to incline, tilt; e.g. of a balance.

d. To be drunk, intoxicated, unsteady.

e. **to tip off, also simply to tip, or tip the perch**: to die.

V2 may be related (but not necessarily) to V1. If so, this would suggest a link between smart or slight blows and severe effects, and clearly this is relevant to tipping points. V1 in turn seems likely to be cognate with 'tip' (noun form 1) as in 'point' or 'top', but this cannot be fully established:

Noun form 1 [N1]

The slender extremity or top of a thing; *esp.* the pointed or rounded end of anything long and slender; the top, summit, apex, very end.

We can see already how all these meanings further feed into our current understanding of tipping points. Yet there is a further etymology which seems relevant, which is the root of N1 but also (demonstrably) of the word 'type' in its taxonomical, representative sense, as in a typical situation, norm or pattern.

'Type' comes from the Greek τύπο([*tuptein*] which connotes both a blow, and, more commonly, things produced by means of a blow or pressure; and hence, the means by which one can reproduce craft objects by moulding, imprinting, etc. (such as seals, which is a primary technological usage; it was also used for engraving, making dots on dice, or other kinds of carving). Over time, *tuptein* became a primary way of thinking about replicating, figuring and modelling in more abstract ways, too. Some meanings of *tuptein* can be listed as follows: **(p.68)**

- 1 A blow, pressing
- 2 The results of a blow: mark, impression
- 3 Mark, figure, image, outline
- 4 General character of a thing: sort, type
- 5 Text, content
- 6 Pattern, example, model
- 7 Summoning.

A relevant early verbal sense of 'type' in English was 'to prefigure or foreshadow as a type; to represent in prophetic similitude', i.e. according to the aforesaid pattern or paradigm.

Overall, one begins to build a picture of a related set of words in which there is a semantic collapse between:

- 1 A smart blow
- 2 Deleterious falling
- 3 Slanting with a sense of the imminent possibility of fall
- 4 The communication or 'summoning' of information about an emergent phenomenon (also there in tip as in a stock market or betting tip)
- 5 The end or top of something
- 6 And, much more vaguely and tendentiously, a replicable 'type' within a category, something designed according to a paradigm.

Obviously different contexts imply different separate historical usages but the widest sense of tipping point which one might infer - the reasonable bundle of connotations - is of an unstable phenomenon which faces two ways in time, doubly summoning information from past (because of the historical push into tipping) and future (because tipping initiates new states). This is anyway cohered in its grammatical dual state as a compound noun (a complex category). The emphasis on 'tipping' rather than 'point' in pronunciation (cf. compounds such as 'bath-house' and 'greenhouse' in contrast with 'bath bun' and 'a green house') allows some room for manoeuvring the concept in a positive direction, i.e. we haven't tipped yet, we are only tilting. But the primary scientific use seems to place the emphasis on point, i.e. the point at which an irreversible critical change has taken place.

The parallels between the past/future conjectures of tipping points and metaphor itself are stimulating to consider, opening up the possibility of a cognitive tipping point in which human beings are able to pursue a higher-level systems-oriented approach to solving complex problems by **(p.69)** 'stretching the present' of their subjectivity to consider future humans and other species. This 'extended body' is the necessary condition of a solution to climate change: to follow the elusive etymological trail, we need to find the new 'type' of being hidden in 'tip'.

The new condition may well involve a turn away from mechanistic (linear) conceptions of world systems to more dynamical frames of thought that account for indeterminacy. This would amount to a shift in cultural consciousness, as we respond to a dialectic whereby tipping events become a recognized norm (but a norm which is always challenging its own normativity). Many people in the world already live this kind of precarious life already: it is us in the insulated West who should change our future outlook. We need to find ourselves a new story.

Metaphor and narrative

Metaphors frame narratives in so far as they condition the worldviews which narratives propose. In storytelling the author or speaker solicits the reader or listener into a story world through a direction ('Imagine that ...') or declaration ('It must have been about nine that the postman rang ...') with a relativistic orientation to ordinary time and being.

This is a form of the illocutionary act, in which fictional world A (often with its *nunc movens*) is proposed to supplant or suspend real world B in which time is irreversible. The story often remains dimensionally indeterminate, so 'A is B' is more like a proposition or option than a linear equation; at least it is optional until what is metaphoric/narrative has become syntagmatic, an intelligible but fixed 'fact' institutionally.

The ability to see the syntagmatic possibilities of the metaphoric, to follow through from the frame to a possible story, which is akin to prediction, is surely part of human risk management. It is there in the brain's reading of perceptions according to particular frames of reference. It is in this area that we need to work hardest to find our new stories, sifting possible futures.

One sees all this very clearly when one hears one's children successively propose in a role-playing game, 'Pretend that ...'. The rapidity with which children are able to run through the narrative options, shuttling between optional possibilities, fills one with hope for humankind; but why does this ability to shuttle between metaphoric frames/narratives ossify so quickly? How to prevent that is a useful research question in itself, but for the time **(p.70)** being some metaphorical and narrative equivalent of physical education might be usefully dispensed to Western adults.

Shell and other companies already do versions of this with scenario writing, as do some government departments, but the process needs to be extended and embedded in society so that, co-creating a better future, we can all become agents of 'the broader genre of declarative illocutions whose function is to inaugurate a new state of affairs' (Genette 1993: 42). In this sense the story of the metaphor of the tipping point is always waiting to be told again, since the context for that retelling always already exists, in the ultimate ground of each individual consciousness.

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Notes:

(¹) However, the equivalence may be perpetuated over longer time series through repeated motifs and artistic concinnity. This is Roland Barthes' point about a 'syntagmatized paradigm'. It is worth bearing in mind, as Čermák (1997) shows, that synchrony and diachrony are much debated terms in linguistics.

(²) Some related temporal aspects of dynamical narratives are addressed from a literary perspective in Mark Currie's 'The Novel and the Moving Now' (2009), which considers the fictional novel as a model of time, specifically for a *nunc movens* (moving now) conception of time. Links to narrative are briefly addressed at the end of this chapter.

(³) I myself write not as a specialist of metaphor within linguistics but as a creative writer who stumbled into the world of complexity while writing a novel. *Turbulence* (2009), which is about

the D-Day weather forecast, invokes the paradigm of turbulent fluid motions across multiple systems to address issues of uncertainty.

(⁴) 'Heidegger's Figures', *Textual Practice*, 26: 5 (November 2012). This essay focuses on Heidegger's insistence that the import of metaphor for philosophy and poetry lies in its structural dependence, as *meta-pherein* or *Über-tragung* (carrying-over), on the dualism between sensuous and nonsensuous realms. In this, the critique opens on to a far more developed thinking on the relation between bodily experience and linguistic cognition, and in particular an attempt to think of the body as a site for an 'articulation' of language anterior to any opposition of sound and sense. The relation of this articulation to resilience could bear further examination.

(⁵) Writing an article on global climate change for a national broadsheet, I received the following communication from the editor: 'But what does it mean for Britain?'

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