Exploding The Creativity Myth

The Computational Foundations of Linguistic Creativity

(Sample Chapter)

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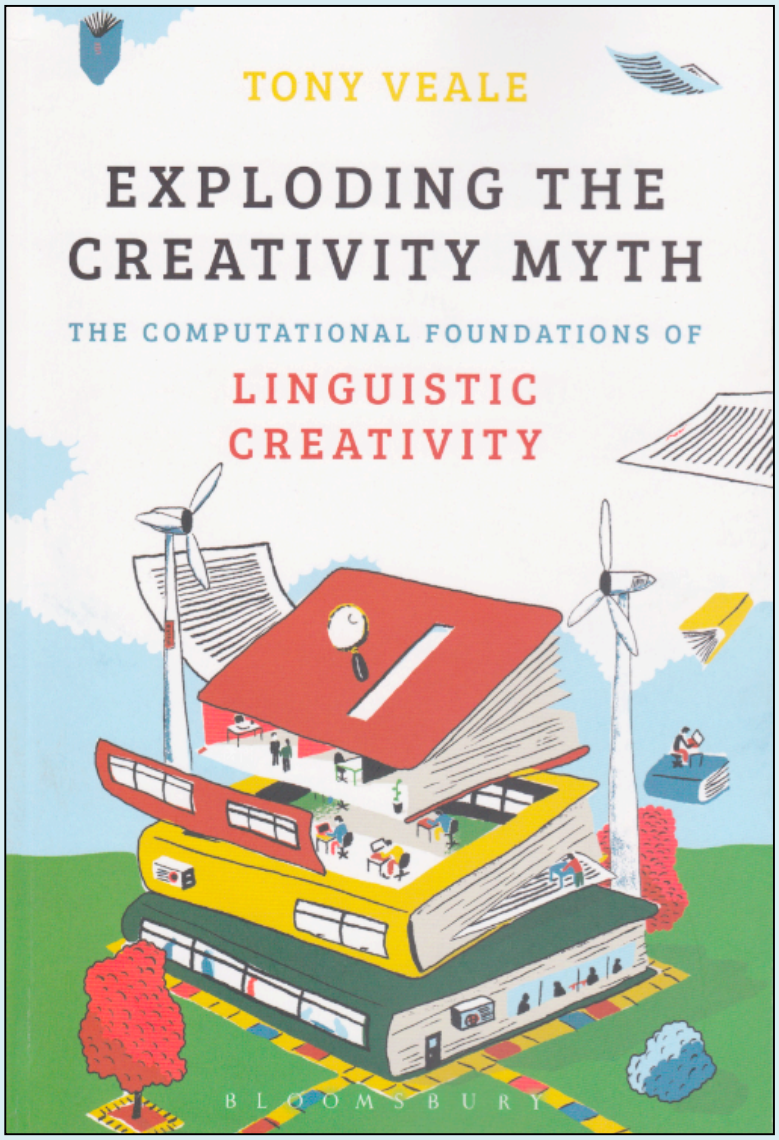

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3 Shock And Awe

Creating a disruption on the road more (or less) traveled

> *Creativity is surprising and refreshing and sometimes even shocking because it is a fundamentally disruptive phenomenon. Creative thinkers achieve outcomes that often seem obvious* after *the act of creation, but these outcomes are far from obvious* before *the creative act. Producers and consumers thus play very different roles in linguistic creativity. A consumer comprehends a finished product, and works backwards from there to appreciate the creative choices that informed its production. In contrast, producers start with an empty page or blank screen, and must identify and pursue those choices for themselves. To understand the relative complexity of the tasks faced by the producer and consumer, we now consider the intricacies of the abstract search undertaken by each.*

Hits and Misses On The Road To Creativity

Our popular creativity myths have become the worst kind of clichés – the self-hating kind. Turncoat clichés like "*thinking outside the box*" urge us to disavow the clichéd and the over-familiar on our path to innovation, linguistic or otherwise. Yet thinking in clichés is not always the same thing as writing in clichés, and the creativity myth that "originality is all" should not lead us to stifle the natural impulse to be reminded of the familiar whenever we try to imagine the novel. Rather, the most productive creators make this impulse work for them, seeing in it a steady supply of material for creative variation.

Andrew Lloyd Webber was certainly treading on very familiar ground when he decided to write a follow-on to his hugely successful musical *The Phantom of the Opera*, and must have hoped the result would be seen as a new lease of creative life for this now clichéd love story. However, the ill-fated sequel, *Love Never Dies*, was damned both by stinging reviews and by very faint praise of the "not quite as bad as the reviews suggest" variety. We have all been bored by movies or stage plays or musicals that have failed to deliver on their promise to entertain. Besides a contemptuous yawn, we have many

familiar phrases for conveying our boredom in these situations: we might say we are "*bored to tears*", "*bored to death*", "*bored out of our minds*" and "*bored beyond belief*", or claim that the experience is "*like watching paint dry*". One influential theatre blog, *West End Whingers*, responded with a creative variation of its own, by suggesting a more apt name for Webber's new musical: *Paint Never Dries*[1].

It's probably fair to say that more people have heard and enjoyed this creative play on Webber's title than have heard and enjoyed the musical itself. The phrase "*Paint Never Dries*" is found over 160,000 times by Google, and at least 10% of these hits are about Webber's production. (The other 90% are about real paint and D.I.Y.) Each creative variation is a linguistic blend of sorts, a mixture of the familiar and the unfamiliar that conveys a new yet recognizable meaning, but the variation "*Paint Never Dries*" is actually a novel blend of two very familiar clichés. Webber's own title, "*Love Never Dies*" was a cliché before it ever graced the marquee of the Adelphi theatre in London's West End, and even served as the tag-line on Francis Ford Coppola's 1992 vampire remake, *Bram Stoker's Dracula*. That too was a tale of deathless love tinged with elements of gothic horror and the supernatural. As much as we might like to open their skulls and root about in their brains, there is no obvious way to retrace the mental processes that led the wags at *West End Whingers* to come up with their parody. Nonetheless, we can ask ourselves which of the following scenarios sounds most plausible. Did they start with the title, *Love Never Dies*, and from there explore the space of possible linguistic modifications until they arrived at a phrase that aptly and satirically expressed their critical viewpoint? Or did they start with the familiar phrase "*like watching paint dry*", which surely came to mind as an immediate expression of their boredom, and from this visceral but unoriginal phrasing seek to find a more creative variation that was also a variation of the musical's own title?

To a computationally-minded thinker, such as a computer scientist, a cognitive scientist, or anyone with a passing interest in algorithmic complexity – let's call these people *computationalists* – these two scenarios are worlds apart. In the former, we imagine the creative producer wandering around a large conceptual space, each step yielding new avenues to explore and new choices to consider, all the while looking for

the switch to that AHA! lightbulb. In the latter, we imagine the creative producer wandering around the same conceptual space, but this time the producer has a well-defined starting point (strong feelings about the play *and* the familiar phrases that these feelings evoke) and a well-defined end point (the play and its title). If it were a race, as it so often is in quick-draw wit, a producer who framed the problem in terms of the latter scenario would surely be the odds-on favourite.

We frequently think of creative behaviour using search metaphors. When seeking a creative solution, we prefer to not "*follow the herd*" but to "*explore new avenues*" and take "*the road less traveled*". While "*looking for answers*", we frequently say that we are "*searching for a solution*" or "*exploring new options*". When a search goes badly, we may feel that we've "*hit a dead-end*" and need to "*find a work-around*", or feel "*lost*" and "*need to backtrack*". But if creativity involves search, metaphorical or otherwise, what exactly are we searching for, and in what terrain do we search? The most compelling answer, it turns out, is offered by computer science, where the search perspective offers a solid foundation for automated problem-solving. Indeed, the search metaphor is so conventionalized in Artificial Intelligence (AI) that it is often derisively referred to as *good old-fashioned AI*, or *GOFAI*. As conceptualized by AI pioneers such as Allen Newell, Herbert Simon and Cliff Shaw[2], the terrain that is searched in GOFAI is not a physical terrain, naturally enough, but a *conceptual state space*. Each problem gives rise to its own state-space, where each space is an inter-connected topology of conceptual possibilities (or states) that a problem-solver can traverse from an initial problem description (called the *start* state) to an acceptable solution state (often called the *end*, or *goal*, state). Viewed through the prism of GOFAI, the key to intelligent behaviour in humans or in machines is an ability to quickly find a cost-effective path from the start state to a goal state. The GOFAI search paradigm, most famously associated with grandmaster-toppling advances in computer chess[3], is thus viewed by AI researchers as the epitome of rational intelligence in humans and computers.

Though state-spaces are not conventional 3-D spaces, it helps to visualize them as such. In Figure 1 we see a somewhat whimsical state-space, visualized as a 3-D surface, with a signposted start-state (e.g., *Love Never Dies*) and a variety of goal-states, depicted

as flowers. The footprints scattered hither and thither show the wanderings of a creative agent, human or otherwise, as it searches for a viable goal state (e.g., *Paint Never Dries*).

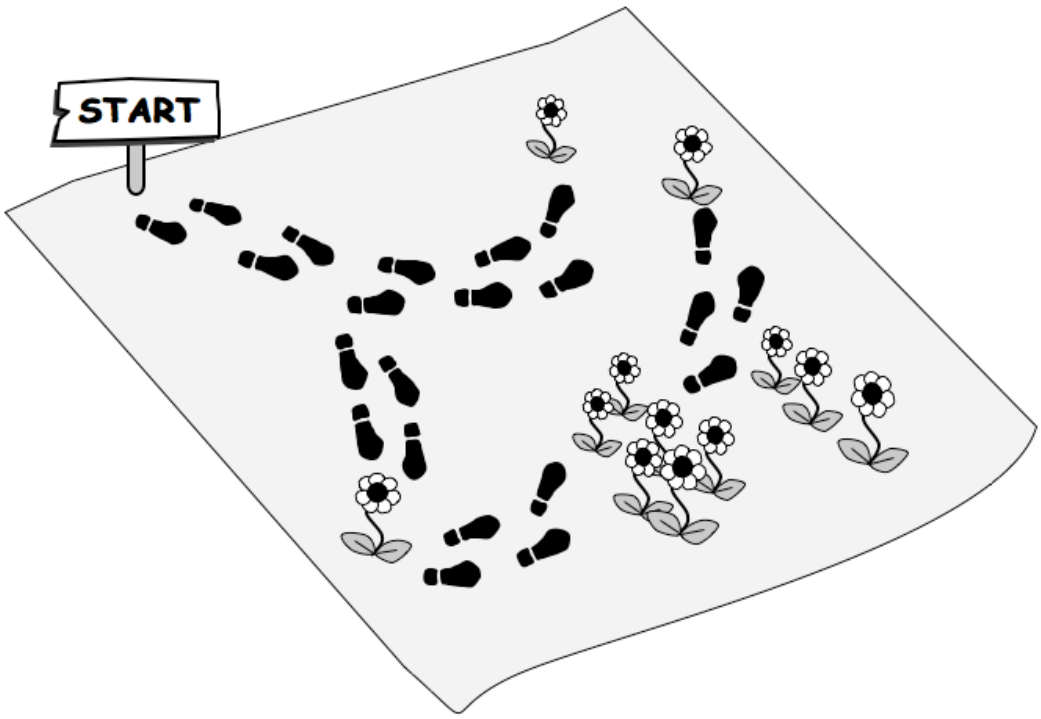

Figure 1. *A problem solver explores a space of different possibilities and solutions. The shoeprints show the path of an explorer wandering through the space. The flowers are valid end-points of acknowledged value, such as creative linguistic expressions.*

Each footstep corresponds to a different cognitive action, such as pun substitution (e.g., *Dies* → *Dries*), and yields a successively different partial solution. Only those sequences of actions that lead to a viable goal-state are considered to be well-formed solutions. Note that the conceptual space in Figure 1 has a rather uneven distribution of goal states. For many problems, viable high-quality solutions tend to cluster together in conceptual space, while great swathes of the space remain barren areas for search. Elaborating the AI search metaphor into a gold prospecting metaphor, the creativity researcher David Perkins pithily refers to these fertile search areas as *Klondike spaces*[4]. As with the discovery of real gold along the Klondike river that precipitated the Yukon gold rush of the 19th century, the discovery of a Klondike space for a given problem can attract a great many prospectors to the same part of the search space, to discover a succession of valid

but relatively homogeneous solutions to the same problem. As we'll see in chapter seven, original thinkers often move on to new uncharted territories when a creative sweet-spot has become too crowded and too fashionable to support genuinely novel creativity.

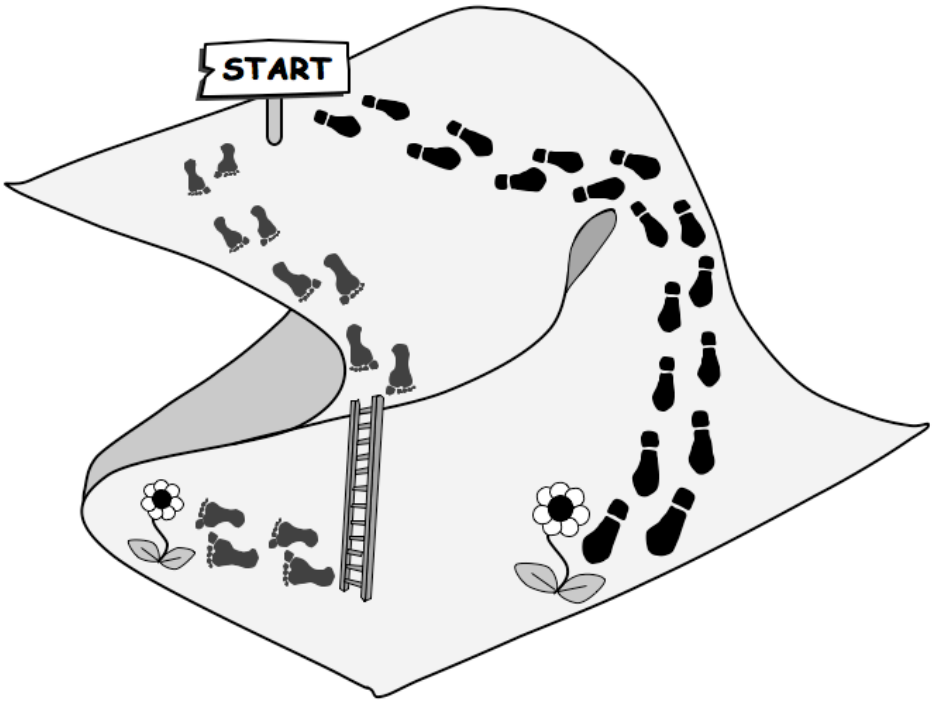

Figure 2. *Different problem solvers explore a structured space of conceptual possibilities*.

A flat and featureless space offers little or no scope for intelligent decision-making, creative or otherwise. Without discernible features to guide the search, our explorers are reduced to fumbling in an undifferentiated conceptual space. Fortunately, interesting problems have interesting search spaces. Though still a highly stylized depiction, Figure 2 presents a more structured search-space with an intriguing geometric quality: the space appears to fold over onto itself, like a kinked sheet of paper. Such a discontinuity or kink can be viewed in two different ways by two different kinds of explorer. The first views the discontinuity as an obstacle to exploration, and effectively goes around it, charting the circuitous course represented by the shoeprints of Figure 2. The second considers the nature of the discontinuity, recognizes that it is not a hard obstacle but a potential *shortcut*, and formulates a means of exploiting this shorter route. The path of this more nimble thinker is depicted by the barefoot trail in Figure 2, while the thinker's creative

approach to the discontinuity is depicted as a simple ladder. As a result of this insight, the second explorer traverses the space more quickly and efficiently, and as shown in Figure 2, is even capable of identifying solutions that a more conservative thinker might miss.

It's worth noting that each of the explorers depicted in Figure 2 acts in an entirely rational manner. Each is an intelligent explorer that reaches a viable goal using a well-informed search process. However, only one of these explorers – the nimbler, barefooted one – deserves to be considered *creative*, for only this explorer engages with the conceptual space to identify a novel or unconventional route to the goal. We whimsically represent this thinker's creative approach to the discontinuity in the space with a ladder, in part to suggest that this new route remains in place for future explorers. Those who follow in this explorer's creative footsteps will find a shorter path to the goal, but successive uses of this shortcut diminish its status as a creative insight. With continuous use, the ladder may even become an integral feature of the space, every bit a fixture as the discontinuity itself. We'll return to the mathematical qualities of this discontinuity later, when we consider its subversive role in the workings of narrative jokes.

For now, why should we care what computationalists think? The computational approach is reductive, to be sure, but it is the best approach we have for cutting through the mythology that pervades our thinking about creativity. Though readers and listeners (the *consumers*) must engage with speakers and writers (the *producers*) in the construction of creative meanings, the producer and consumer play very different roles under very different computational conditions when engaging in a creative act. Production is not simply consumption in reverse, and the processes employed to understand and appreciate linguistic creativity provide only part of the answer as to how that creativity is produced. After the fact, a creative insight can usually be explained as a collection of simple actions, knowingly performed in the right sequence to go from an intended meaning (and little more than a blank page) to a finished form, such as a pithy text. The consumer's task is to find the most sensible way of re-imagining these steps from a given text back to the producer's intended meaning ("so long a chain, and yet every link rings true", as Dr. Watson might say). Though non-trivial, this task is heavily constrained by the consumer's expectations, not just of the text, but of the producer and

of the world. In contrast, the producer's task is to find a sequence of steps from the intended meaning to a final linguistic form that has not yet been identified. The producer may well be guided by unstated constraints that derive from an understanding of what the consumer expects and of what the consumer can realistically comprehend, yet even when this sequence is short, the space of possibilities is still huge. In computational terms, the producer faces a vastly more complex search problem than the consumer.

While GOFAI search is inherently algorithmic, creativity theorists such as Margaret Boden and David Perkins have nonetheless embraced the notion that creative behaviour can emerge from the exploration of an abstract conceptual space. However, Boden argues that the most striking creativity arises whenever a producer transforms the space itself, to effectively change the rules of the game. For instance, Arnold Schoenberg's development of his influential twelve-tone technique challenged the convention that well-composed classical music must be played in a specific key[5]. In fact, Schoenberg created a novel system of *tone rows* to ensure that all twelve notes are given equal importance in a composition, so that none is so prominent as to be considered primary or key. Schoenberg's innovations were considered radical in their day, and were classified by the Nazis – along with jazz, of course – as *degenerate* art. In a very real sense, Schoenberg created a new conceptual space for musicians to explore, by transforming a space that had been so thoroughly explored by more traditional composers. Boden gives the name *transformational creativity* to this kind of game-changing innovation[6].

Figure 3 offers a visual metaphor for Boden's notion of transformational creativity[7]. A creative explorer, unwilling to explore the conceptual space as conventionally defined, decides to climb *outside* this space, in the hope of finding viable solutions of even greater novelty and value beyond the presumed limits of the conventional space. The solutions that one finds outside the conventional space may have markedly different qualities than the solutions explorers have traditionally found inside the space. As in Schoenberg's case, it then becomes necessary to "sell" these new kinds of solutions to a skeptical audience. We'll consider such a *buying and selling* model of creativity in the last chapter.

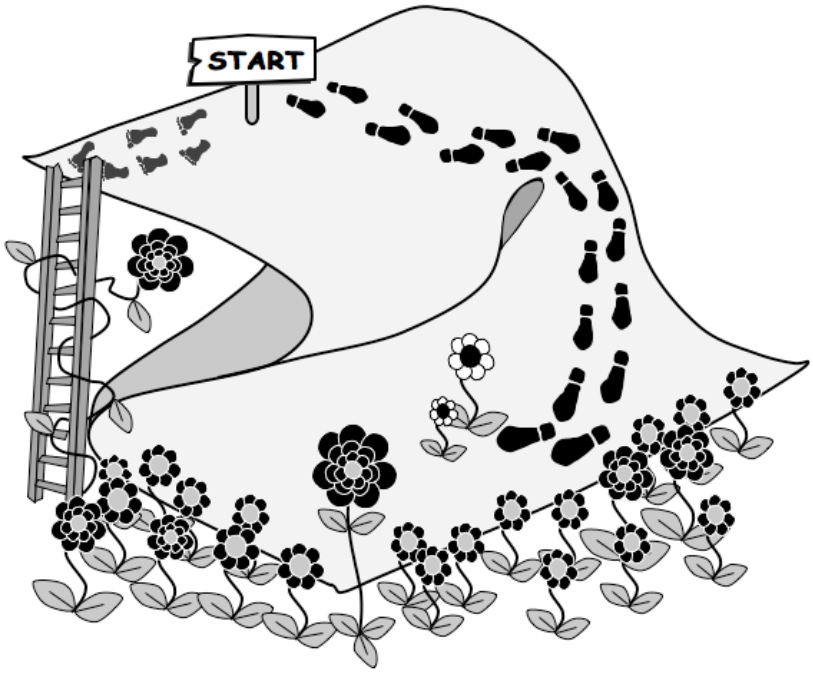

Figure 3. *A transformational thinker re-imagines the defining constraints and conventions of a genre, to create a new search space, rich in untapped possibilities.*

Of course, non-transformational exploration, or what Boden calls *exploratory creativity*, can also yield very satisfying results. A gifted chess player, for instance, can formulate creative strategies without changing the rules of chess, and we owe the music of Mozart to his relatively narrow but wonderfully productive exploration of the space of tonal music. However, given the immensity of the search space for even simple-seeming problems, producers cannot afford to be ploddingly exhaustive in their search, and must bring as many constraints to bear on their explorations as possible. It is in the use of such constraints to cut away great swathes of the search space, and to identify other areas as potential sweet-spots (or *Klondikes*) for creativity, that the computational perspective comes closest to providing a concrete basis for such metaphysical notions as insight and inspiration. For linguistic producers do have one key advantage over linguistic consumers: they know *before* the creative act the meanings they want to communicate, and also appreciate the full range of feelings and resonances that their linguistic forms are intended to evoke in the consumer. This diverse collection of conflicting constraints may well fight each other for dominance, but if properly harnessed, these constraints can

collectively exert a coherent influence on the choice of conceptual and linguistic pathways that are explored by the creative producer.

The key to cooperation lies in viewing constraints as *soft* preferences rather than *hard* demands. In this way, conflicting constraints can avoid deadlock by nudging the producer's exploratory processes toward those paths of least resistance where the smallest number of constraints are violated. Such a view of creativity – which can aptly be described as the "constraints welcome!" view – has been championed by Douglas Hofstadter, a physicist turned cognitive (and computer) scientist who argues that the interaction of competing pressures and constraints is the means by which creativity produces such diverse and unexpected results[8]. Robert Frost compared the disorientating lack of formal constraints when writing free verse to playing tennis with the net down[9], while Orson Welles once described the absence of constraints as "the enemy of art"[10]. Hofstadter would surely agree; he has argued, from a literary and a computational perspective, that the interlocking constraints of metre and rhyme allow both humans and computers to more effectively navigate the space of creative poetic expression[11]. Constraints are a necessary part of any satisfying challenge, and though they may often seem a nuisance, in creativity they are a blessing: not only do they help us negotiate immense search spaces, they can make the results of our explorations seem rich with secondary meanings, clever resonances and semantic tension.

When solving a problem, it is reassuring to have a time-tested plan of attack as well as an agreed definition of what constitutes a good or even optimal solution. Nonetheless, exploration of a complex search space can be a *divergent* process, much like beheading a Hydra: each head we cut off may lead the beast to grow several more in its place. Should we choose not to embrace this divergence, we can instead attempt to constrain it, by pursuing a divide-and-conquer strategy that successively narrows the search space and forces the search to converge toward a single possible solution. But if we want a diversity of solutions that exhibit a range of complementary strengths, we should use what the psychologist J. P. Guilford has called *divergent thinking*[12]. Guilford argued that this ability to generate a diverse range of different solutions, or to pursue a diversity of different search avenues at once, is a key enabler of creative behaviour. In practice,

however, truly divergent thinking in a large search space is not sustainable if each of the divergent paths that we pursue branches and forks into combinatorially more avenues and laneways. Computers cannot handle the ensuing combinatorial explosion, but neither can humans, creative or otherwise. Creative people instead seem to select a manageable number of different pathways through a conceptual space. So while a chess-playing computer will crunch millions of different positions and possibilities to arrive at a move, a human grandmaster considers a much smaller basket of options. The trick is to know which avenues to pursue and which to avoid. In the end, it is not how many avenues we search, but the novelty of our trajectory, that makes the difference. So to the extent that a producer can reconcile different constraints and conflate different search avenues into a path less traveled, the result can seem quick-witted, novel and insightful.

Two conflicting constraints or search avenues can often be reconciled with great concision in a single linguistic form that combines elements of two different solutions. Remember the variations "*sleight of tongue in cheek*" and "*sleight of foot in mouth"* in the last chapter? The cognitive linguists Mark Turner and Gilles Fauconnier describe this kind of combination as *blending*[13]. Blending is an integration of two or more sources of knowledge, whether linguistic or conceptual or both, to achieve a combined result that is novel yet familiar. So governor Ann Richards of Texas used blending when, in 1988, she described George H. W. Bush as a poor little rich-boy who "*was born with a silver foot in his mouth*"[14]. This much-quoted phrasing is a clever combination of two idioms that often come to mind when thinking of politicians in the Bush clan. Rather than rejecting either for its over-familiarity, Richards simply conflated both to cut short the divergent search for an equally concise replacement. In a memorable *Garfield* cartoon – how often do we get to say that? – the fat tabby passes a dog with a sign that says "*Will eat homework for food*". Both dogs and hobos beg for food, yet we rarely view one in terms of the other. Blending not only allows us to conflate the two, it produces a hybrid result that is more than a dog and more than a hobo. Though quite a sophisticated blend, it is motivated by an overlap in two familiar phrases, "*will work for food*" and "*the dog ate my homework*".

Most non-trivial blends, and virtually all of the clever ones, involve some degree of compromise. Fauconnier and Turner describe blends as selective projections from two or

more knowledge sources: some elements get highlighted, and perhaps even exaggerated, and others get cast aside so that the grand combination can actually work. This kind of semantic compromise has been given the name *slippage* by Douglas Hofstadter and Melanie Mitchell[15]. When we, as producers, encounter something that just doesn't work, it is slippage that allows us to transform the troublesome element into something more accommodating. But once again, slippage is a divergent phenomenon, since we can often transform a blocked constraint or a violated expectation in a variety of meaningful ways. Thus, if Hillary Clinton were to become U.S. president, we could refer to Bill Clinton as first *lady*, or first *man*, or first *husband*. If Bill were to balk at "first lady", Hillary could still keep this title for herself. She would, in a strong sense, truly be *first* lady, but many of our expectations of what the title means would have to slip away. Hofstadter's notion of slippage plays an important role in the production of any creative variation. When we replace "dies" with "dries" or "love" with "paint" in "*Love Never Dies*", or "witness" with "apostle" in "*witness protection program*", we are engaging in slippage at a phrasal level. These replacements are not arbitrary, but governed by an intuitive sense of what can be substituted with what. In Hofstadter's terminology, the space of slippage possibilities can be captured by a *SlipNet*, a network of terms and ideas in which those that have the potential to slip into one another are explicitly connected by weighted links.

So a mastery of slippage allows for a mastery of creative variation. In general, one idea can slip into another to the extent that both are similar, while two words can slip into each another if both denote *SlipNet*-related ideas. Some slips have more semantic support than others, as reflected in the observation that witnesses and apostles are more similar to each other than hands are to wings or burqas are to sunglasses. But semantic similarity alone is no guarantee of slippage potential, and for slippage to work gracefully, we should intuitively feel that one word or idea can sensibly by compared and contrasted to the other. Burqas and sunglasses are both items of clothing; witnesses and apostles are different kinds of informer; hands and feet are each a kind of body part; and so on. In a good pun, a rare thing indeed, the slippage of one word into another is based on phonetic *and* semantic similarity, or is motivated by strong conceptual grounds (as in *Paint Never Dries*). In the very worst *groaners*, violence is done to the structure of a larger word to shoehorn a weak phonetic substitution into place. Even creative slippage has limits that

must be respected, though it takes insight to know exactly what those limits are. When we stretch the slippage potential of a word or idea too far, as in a dreadful pun or a lame substitution, that groan we hear is the sound of elastic about to snap.

Many creative linguistic blends stretch the slippage elastic half-way, to identify a noteworthy midpoint between two conceptual positions. A 2008 cover story in *Esquire* magazine[16] described the bodybuilder-turned-politician Arnold Schwarzenegger as "the President of 12% of Us". At the time, Arnold was riding a wave of voter satisfaction as governor of California, before the state was to become bogged down by serious financial difficulties. Late-night comedians had often joked about the prospect of Arnold actually becoming president of the United States, though the Austrian-born politician would be ineligible to run without a prior change to the constitution. Nonetheless, Arnold surprised many by winning the governorship of California in a recall vote for the monochromatic incumbent, Gray Davis. His early successes as governor also surprised a great many political commentators, who found it odd to imagine this likeable but wooden star of the *Terminator* and *Conan* movies suddenly wielding so much power in America's largest state. The label "Governator"[17], coined as a lexical blend of *Govern*or, his new job, and Termin*ator*, his iconic role, quickly stuck. Arnold may not have become president of the US, but he became the next best thing: leader of the US state with the largest population and the biggest economy, contributing 12% of the nation's GDP. We see here two acts of creative slippage: governors are like presidents at the state level, so "president" can slip into "governor" and vice versa with little semantic resistance; and California is a microcosm of the US, and can accurately be described as "12% of the US" (or "12% of Us" if you are American). This slippage allows us to stretch the elastic half-way, to the point at which the most optimal innovation is produced. Because Arnold is governor of California, he is also – with a generous pull on the elastic – "*President of 12% of the US*".

Creativity is a restless patient that vigorously resists the straitjacket of formal definition, especially the one-size-fits-all variety. The most that any formal perspective can do for us is shed light on just one aspect of this multi-faceted phenomenon. J.P. Guilford was right to emphasize the importance of divergent production in creativity, and the need to reward both *fluency* (the ability to generate many different ideas) and

flexibility (the ability to generate different kinds of ideas), yet Guilford's is just one valid perspective among many. The pioneers of good old-fashioned AI (GOFAI) alternately emphasized the importance of intelligently navigating a complex space of solution possibilities, while Margaret Boden has emphasized the sometimes transformative role of creativity in redrawing the boundaries of these spaces. For his part, Douglas Hofstadter has emphasized the importance of compromise and slippage when dealing with the many interacting soft constraints of a challenging problem, and even goes so far as to view constraints as welcome grist to the creative mill. John McCarthy, one of the founders of modern AI – he and Marvin Minsky first coined the term *Artificial Intelligence* back in the 1950s[18] – has argued that a solution to a problem is creative if it employs a concept that is not explicitly mentioned in the specification of the problem[19]. In other words, McCarthy emphasizes the role of *insight* in creativity, and even provides a rather good working definition for this often mysticized notion. Arthur Koestler had earlier suggested that the roots of scientific, artistic and humorous insight lie in a single cognitive process called *Bisociation*[20]. His ideas, which were to be greatly elaborated and reworked by Gilles Fauconnier and Mark Turner in their model of *conceptual blending*, view creativity as emerging from the reconciliation of very different mental representations, or in Koestler's own rather quaint terminology, *matrices*.

There are also shades of Koestler in what has become the dominant theory of verbal humour, the *General Theory of Verbal Humour*, or GTVH[21], of Salvatore Attardo and Victor Raskin, just as there are shades of the GTVH in Fauconnier and Turner's blending theory. As we'll see next, the GTVH views the humour of jokes as arising from the bisociative friction between, and logical reconciliation of, similar but diverging scripts.

Departing From The Script: Tell Me A (Slightly Different) Story

Improvisational comedy, or "improv", bills itself as the kind of live comedy event that throws away the script. Rather than following a pre-scripted course, improv comedians ask the audience to suggest their own topics and themes for spontaneous play-acting. In fact, even though the audience appears to calls the shots, improvisational comedy remains utterly dependent on scripts; not the stage scripts written by professional humorists and

gag-writers, but the routine scripts that we all follow in our everyday lives. Most topics suggested by the audience, such as "going to the dentist" or "ordering dinner in a snooty French restaurant", are evocations of familiar scripts that the improv troupe should play out with a humorous twist. So the humour of improv is only superficially script-free. Deep down, it relies on the creative variation of scripts that are so well-known that no-one has ever bothered to write them down or give them a name.

Are these everyday routines really scripts? Most cognitive scientists think so, at least in an abstract sense. For them, a "semantic script" is a schematic mental structure that captures our shared experience of a stereotypical routine, by binding together information about its typical setting and participants, as well as the expected sequence of actions and their effects. The term "script" was popularized in the 1970s by Roger Schank and Robert Abelson[22], influential AI researchers who viewed scripts as clumps of common-sense knowledge that one needs to really understand natural language. They argued that neither a computer nor a human can make sense of a story about, say, going to a restaurant, unless it knows what usually happens when a typical person goes to a typical restaurant. Without a restaurant script, an ill-informed observer could not, for instance, infer that a diner enjoys a meal from the fact that the waitress receives a large tip, or infer that a diner dislikes a meal from the refusal to leave any tip at all, or a refusal to even to pay the bill. A novel experience prompts us to either learn a new script or revise an existing one. But sometimes we get it wrong, and find ourselves triggering a script that merely seems appropriate, but which is actually truly and deeply inappropriate to a given setting.

This happens all the time whenever we read *whodunnit* novels with devious twists, or watch movies by artful directors who trick us into jumping to the wrong conclusions. But this tendency to apply a script before we know for sure that it apt is most often exploited by jokes, which delight in tricking us into applying the wrong script to a narrative. The moment of truth arrives with the punchline, which reveals our folly and playfully punishes us for our rush to judgment. Consider what is undoubtedly the most analyzed joke in the humour literature, as brought to us by the humor theorist and computer scientist Victor Raskin. It concerns a young man who pays a visit to the doctor's office. With a low bronchial whisper, the man asks the doctor's pretty young wife "is the doctor

in?", to which the wife replies, with a smile, "No, come on in". So what starts out as an apparent instance of the *visit-to-the-doctor* script instead turns out to be an instance of the *affair-with-a-married-woman* script. With this realization, we reinterpret what has gone before: the young man's bronchial whisper is not a symptom that needs a doctor's attention, but a clichéd ruse to avoid the doctor's attention in the first place. The linguist and humour researcher Wallace Chafe argues that it is only the absurdity of the way the affair is conducted that gives the joke its humour[23], yet it's hard to see much in the way of absurdity here. Recall, however, Kakuzo Okakura's claim that the most successful art engages and draws in the audience, making the viewer complicit in the resulting work. This joke is certainly no masterpiece, but the same principles of engagement and complicity apply as much to jokes as they do to paintings or poems. By hinting at the possibility of immoral behaviour, and fuelling the reader's lewd suspicions, the joke succeeds in making the reader complicit in the conduct of an illicit affair. In other words, the joke offers a knowing wink and a smile to those of us with dirty minds.

The notion of script opposition lies at the heart of an influential theory of humour first proposed by Raskin in 1985. His theory, the *Semantic Script Theory of Humour*, or SSTH[24], builds on Schank and Abelson's view of scripts as the tectonic plates of text understanding. In this view, the most coherent interpretation of a text is given by the most appropriate script that provides the most explanatory coverage. However, as we've seen, two or more scripts can be triggered by even a short text, and humour can arise at the fault lines where two scripts compete to provide an overall interpretation of a text. This opposition typically comes to a crunch point at the end of the joke, when the punchline forces a wrenching collision. Yet script opposition is not itself a guarantee of humour[25], and though an opposition can prompt us to ditch an inappropriate script for a more appropriate alternative, a marriage of both scripts together should still be possible at another level of interpretation. Humour theorists approach the mysterious marriage of sense and nonsense that lies at the heart of a joke in different ways, and with different terms. Neal Norrick refers to it as the "method in the madness" of a joke[26]; Jerry Suls[27], as well as Victor Raskin and Salvatore Attardo[28], refer to it as the "resolution" of the incongruity of a joke; and Elliott Oring, the cultural anthropologist and folklorist, describes it as the "appropriate incongruity" of a joke[29], reflecting sociologist Erving

Goffman's view that "any accurately improper move can poke through the thin sleeve of immediate reality"[30]. Yet however we define the incongruity[31], and whatever we call the resolving operation that makes sense of it, the principle remains the same: a joke must allow us to salvage sense from nonsense to gain a useful insight into the incongruity[32].

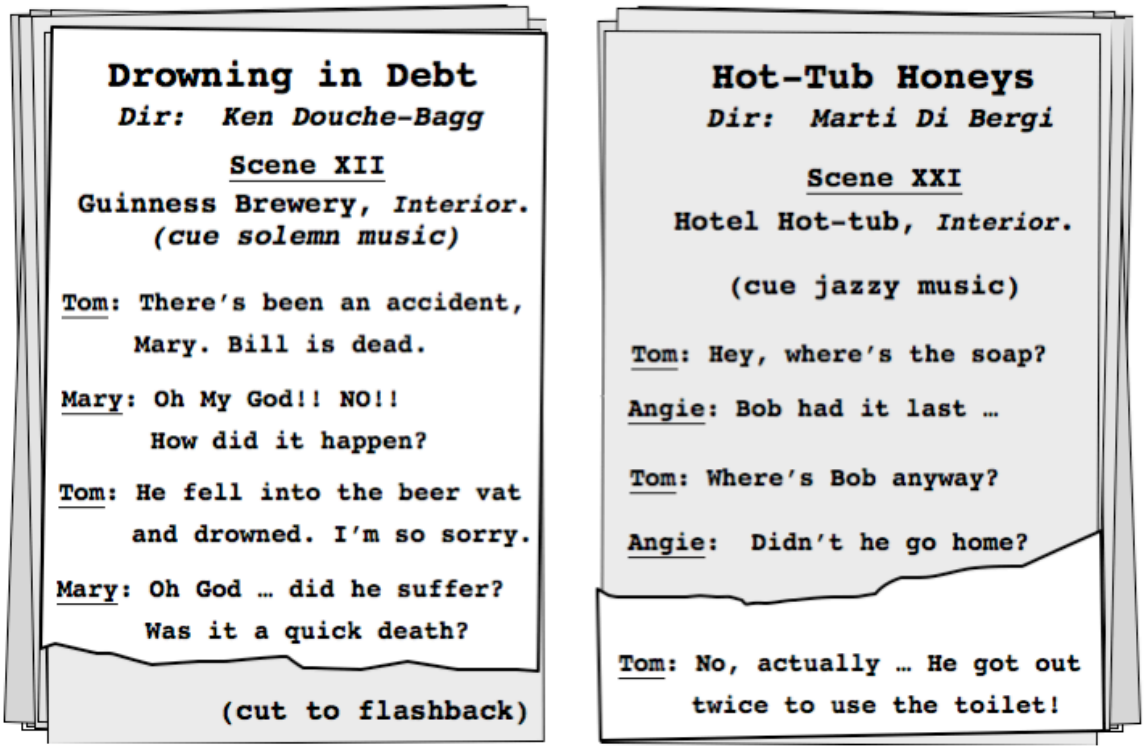

Figure 4. *Most narrative jokes employ a cross-over of different scripts. We understand the body of the joke using one script, but are finally forced to switch to another. The white fragments above (read from left to right) form an emergent narrative of their own.*

Figure 4 demonstrates how a joke narrative can be created as a blend of two very different scripts. In this case, each script establishes a tone and a theme that seems incongruous when viewed from the perspective of the other. Nonetheless, both can be woven together, with a little snip here and there, to produce a narrative that reads coherently. If the resulting script seems to veer madly from tragedy to farce, then that is precisely the point of the exercise. One script provides the tragedy, the other the farce, and the sudden transition from one to the other provides the comedy, provided of course that the transition is well-timed and the result is understandable as a coherent narrative.

Most narrative jokes employ creative variations on familiar scripts. This variation mischievously makes one script look like another, a *false friend* of sorts, causing the listener to initially trigger the wrong one[33]. When the moment of truth arrives, we are forced to see our mistake, switch scripts, and perceive a logic to the incongruity. But jokes are not just variations on scripts; they are often variations on other *jokes*. If you've heard an ethnic joke that makes fun of Irishmen, you can be confident that someone, somewhere, is using the same template to make fun of Germans, or Poles, or some other cultural target. Deep reuse occurs when two jokes put very different flesh on the same logical skeleton. Consider the following pair of jokes. Two English businessmen, with bowler hats and umbrellas, are waiting for a train. One proudly says to the other, "*My great-grandfather died at Waterloo, don't you know*". The other replies, witheringly, "*Oh? which platform*?". Now, compare this gag from the late great Bob Monkhouse: "*I still have sex at 75! I live at number 74, so it's no trouble at all*". These two jokes seem very different, yet both employ the same logical device. What appears to be a temporal signifier, of an impressive age (*75*) or a historical event (*Waterloo*), is instead interpreted as a banal physical location. In the commuter joke, the shift from historical significance to mundane insignificance is used to undermine the speaker and puncture his pomposity. In the Monkhouse joke, the shift from a distinguished age to a mundane place next door undermines his boastful claim to have a vigorous sex life. If humour research was stamp-collecting, we'd have good reason to put both of these jokes in the same plastic pocket.

Douglas Hofstadter has coined the term *Ur-joke*[34] to refer to the notional first uses of a joke on which later variations are based. *Ur-joke* is a creative variation on *Ur-text*, a term used by literary scholars to describe an imaginary reconstruction of an earlier text that has since been lost to history. So *Ur-joke* nicely captures the evolutionary nature of jokes, suggesting with a wink that many contemporary jokes are variations on long-lost gags that once echoed in the ancient cities of the Old Testament. Conversely, in their *General Theory of Verbal Humour*, or GTVH, Salvatore Attardo and Victor Raskin argue that jokes exhibit deep similarities because they employ the same logical mechanisms to create humour. The GTVH is an elaborate and much-used theoretical framework[35] built on the script-based foundations of Raskin's earlier SSTH. Attardo, Raskin and others have since identified tens of unique logical mechanisms that generalize over thousands of

superficially different jokes[36]. You may remember the joke about a mad scientist from (insert country of choice) who builds a rocket to fly to the sun, but launches at night to avoid being burnt to a crisp. We see here the logical mechanism of *false analogy*: the sun isn't a lightbulb that is hot only when it's bright and turned on in the daytime, and cold when it's seemingly dark and turned off at night. How about that old Russian chestnut in which a factory worker steals a different wheelbarrow every night, from right under the noses of the factory guards? This one derives its humorous logic from the mechanism of *figure-ground reversal*: the guards are so fixated on what the worker might be hiding in his wheelbarrow that they fail to see the wheelbarrow as an object worth stealing in itself.

We can think of Hofstadter's *Ur-jokes* as the notional roots of a large and tangled family tree of jokes, while the logical mechanisms identified by the GTVH are a key part of the genetic information inherited by variations from their forebears. Undoubtedly, some jokes are lineal descendants of others, and this would be represented in our family tree as a parent / child relationship. When Winston Churchill said "*I am easily satisfied by the very best*" he was clearly channeling Oscar Wilde, who had earlier said "*I have the simplest tastes. I am always satisfied with the best*". However, some creative variations are more easily recognized as logical borrowings than others, and many jokes that share a deep similarity have a less obvious kinship. Another aphorism commonly attributed to Churchill is used to explain the left-to-right trajectory of his political career: "*If you're not a liberal at twenty you have no heart, if you're not a conservative at forty you have no brain*". No one is entirely sure whether Churchill actually said this, or even words to the same effect, but earlier variants of this phrase have also been attributed to Georges Clemenceau and Otto von Bismarck. The variant that commonly attaches to Clemenceau is "*Any man who is not a socialist at the age of 20 has no heart. Any man who is still a socialist at the age of 40 has no head*". One might also recognize in these aphorisms a certain similarity in structure and sentiment, if not in political inclination, to a witticism coined by the British politician and writer Horace Walpole over a century earlier: "*Life is a tragedy for those who feel, but a comedy for those who think*".

In other words, sensitive liberals lack a rational brain, while rational conservatives lack a sensitive heart. Both Walpole and Churchill (or Clemenceau or Bismarck) seem to

agree that the latter is the preferable state of affairs. What these two witticisms have in common goes far beyond a shared logical mechanism, for each offers a different creative expression for precisely the same political world-view. Yet both are different, and both are original, even if the sentiment itself is old. In contrast, Vladimir Putin was clearly trying to sound Churchillian when he quipped that "*Whoever does not miss the Soviet Union has no heart. Whoever wants it back has no brain*". Nonetheless, for all that it presumably owes Churchill, Putin's remark is still funny, and still creative, if not entirely original. In the words of Giora and Hanks, Putin has given us an optimal innovation, a novel exploitation on a familiar quotation that packages its own unique meaning into a form that has already proven its comedic value.

Creating A Fuss On The Road More Traveled

When given very few lines to speak, it can be hard for an actor to make a memorable impression on an audience. Bit players are rarely given the most important lines, yet what they have to say can be just as vital in maintaining the flow of a narrative. In *Macbeth,* Shakespeare provides just five lines to a character called *Seyton*, Macbeth's lieutenant, but one of these lines is absolutely pivotal to the play. When a conscience-stricken Lady Macbeth dramatically kills herself, and her death scream prompts Macbeth to ask "*Wherefore was that cry?*", it is Seyton who delivers the grim news with the line "*The Queen, my lord, is dead*". Though lacking a certain poetry, the play would simply stop in its tracks were this line to be omitted. Yet, as theatrical legend has it, this is precisely what happened when Donald Wolfit, a Shakespearean actor famed as much for his ego as his acting, took *Macbeth* on the road over half a century ago. Wolfit had given the part of Seyton to an ambitious young actor, who, when his ambitions were thwarted, found a most ingenious way to extract his revenge. When Wolfit next played Macbeth, Seyton did not give Shakespeare's familiar reply to the question "*Wherefore was that cry?*", but a show-stopping variation, "*The Queen, my Lord, is very much better*"[37]. Like a tiny but well-placed explosive, this creative variation would have had a hugely disruptive effect on the flow of the play, leaving other actors in a state of confusion and stunned silence.

Though verging on the tasteless, the concept of an improvised explosive device, or

IED, offers a useful metaphor for the workings of the most surprising variations. In a 2010 letter to *The Economist*, a former U.S. army combat engineer named Charles Rei lamented the military's over-reliance on "gee-whiz gadgets" for neutralizing the threat of roadside IEDs in Iraq, adding that the military had "continually underestimated the intelligence and creativity of the soldiers and insurgents"[38]. Rei offers his own view on what form this creativity should take: "The easiest way to predict the location of an IED is to look a map and think, where would I put one? Choke points, avenues of approach, intersections, areas of routine use; these are the places where IEDs are found". He further notes that "an insurgent wouldn't waste resources building, placing and watching over an IED that had little chance of success". Insurgents target choke points because they are highly vulnerable to the application of a small but unexpected force. Indeed, the tighter the choke point, the less force that is needed to achieve a devastating effect. So, though Shakespeare offers Seyton a most meagre role, his fifth and final line is a significant choke point in the narrative of *Macbeth*, and it is in this line that the disgruntled actor can lay his trap. With the unstoppable dramatic force of the play barreling through this point of the narrative, it only takes a little well-timed pressure to derail the whole show.

Most well-crafted jokes in the script-switching tradition are deliberately constructed around a similar choke point in the narrative, a point where maximum surprise can be achieved with a minimum of effort. For once a listener triggers the wrong script and becomes fully committed to a certain avenue of interpretation, it takes just a little force from an "appropriate incongruity" or an "accurately improper move" to stop the listener's advance with a sucker-punch of a punchline. So while joke tellers and joke listeners navigate the same conceptual space, only one has a map. The teller, who already knows the ending to the joke, understands the space intimately, while the listener, who may have no specific knowledge of the terrain, must use more general common-sense knowledge of the world as a guide. This, of course, turns out to be a mistake, for the most obvious route to the goal is not a viable route at all. As shown in Figure 5, and in a subversive switch to the roles depicted in Figure 3, it is the knowledgeable joke-teller (depicted as the more nimble, barefoot explorer) who takes the circuitous route through the conceptual space. The discontinuity is not a short-cut, but a logical trap, into which an unsuspecting listener (the plodding, heavy-shoed explorer of Figure 5) awkwardly falls.

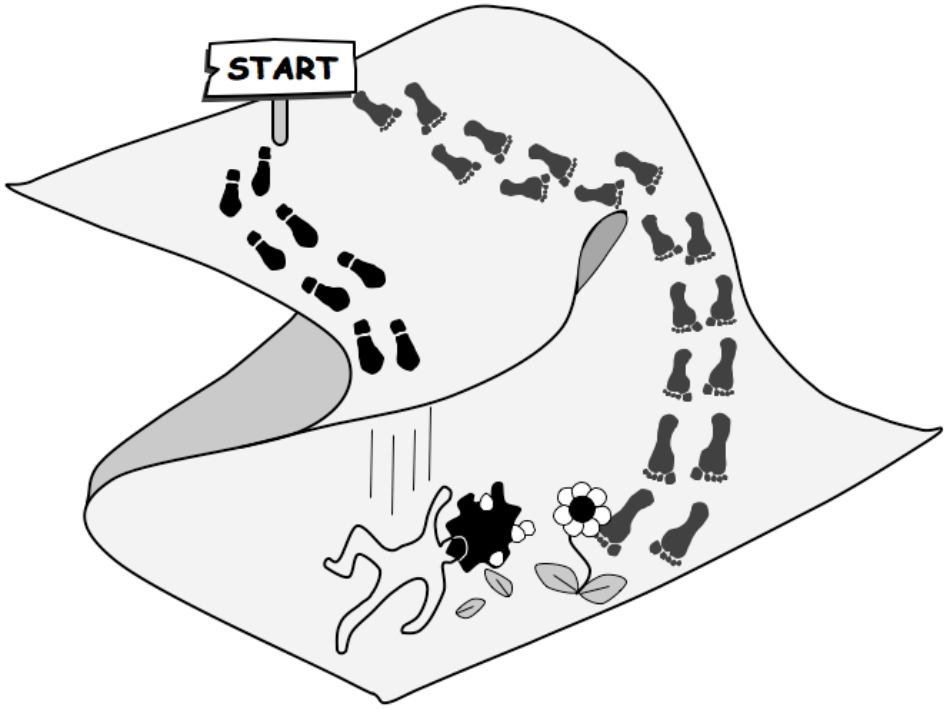

Figure 5. *A joke-teller and joke-listener navigate the search space of possibilities very differently. In a reversal on Figure 3, the joke-teller takes the longer "safe" way through the space, while the joke-listener takes the more obvious but ultimately "fatal" route*[39].

You could say that the discontinuity at the heart of a joke proves to be a *catastrophe* for a naïve explorer, in logical terms at least, while the joke-teller glides smoothly around this pitfall. And in mathematical terms you would be right. The kinked surface depicted in Figures 2, 3 and 5 is widely used in a branch of mathematics called *Catastrophe Theory*. Invented by French mathematician René Thom in the 1960s, catastrophe theory[40] allows us to study the geometry of discontinuous forms, where a small change in an input variable can cause an abrupt and extreme change in output value. Catastrophe theory has been used to model everything from stock market crashes to the moods of bipolar artists to the sudden collapse of empires and civilizations. The mathematician John Allen Paulos has used catastrophe theory to sketch a theory of humour along the lines discussed here[41]. Though schematic in outline, the account offered by Paulos is nicely consonant with the view of creativity as intelligent search in a space of many different conceptual possibilities. In each case, what makes *creative* behaviour different from regular *intelligent* behaviour is the way the explorer exploits the discontinuous contours of the

conceptual space, either as logical shortcuts in the race to find novel solutions quickly and efficiently, or as logical deathtraps in the humorous misdirection of a good joke.

In mathematical terms, the perceived incongruity of a joke corresponds to a sudden discontinuity in conceptual space. An unthinking listener who plows through the space on the basis of conventions, expectations and habitual readings will need very little pressure to be tipped over into the chasm of the discontinuity. Just as the tightest choke points need the least force to achieve a dramatic effect, the merest incongruity in a punchline can be enough to force the listener into a radically different interpretation of a text. So to be creative with language, it helps to think like an insurgent, and ask: where are the choke points in this phrasing? What discontinuities between words or phrases and their habitual meanings can I exploit? The most vulnerable points are those that the permit the greatest leverage, so that the most subtle variation can turn its meaning upside down. Often, we need only vary a single word in a familiar form to turn a glowing tribute into a wounding insult, as when talk-show host Clive Anderson asked author Jeffrey Archer "*Is there no* beginning *to your talent?*". Even the subtlest logical nuance can carry a humorous wallop if it is couched in a familiar but misleading form, as in this gag from the British sketch-writer Barry Cryer: "*Four Jewish ladies of a certain age are having lunch in a restaurant. The waiter comes over and asks 'Is* any*thing all right*?'"[42].

Déjà Vu All Over Again

Of course, there is a much simpler and altogether more obvious way of up-ending the meaning of a text. It's called negation – we simply add "not" to any phrase whose meaning we want to invert. Negation may be the most obvious way to achieve this effect, but it is hardly the most creative, even if teenagers still think it clever to place negation markers at the very end of a statement as a sarcastic signal of displeasure. In language, teenagers may be the ultimate insurgents, but the sentence-trailing "Not!" is a crude IED that is lacking in surprise and is easily neutralized. Nonetheless, teenagers do plant their little sarcasm bombs in the right place. An unexpected variation at the end of an utterance has maximal surprise value, leading an audience down the garden path toward an interpretation that is never realized. Likewise, an unexpected deviation from a familiar

script can be just as shocking when it arrives at the end of a joke. Some jokes even go as far as to employ repetition in the body of the text to reinforce an expectation that is finally dashed in the punchline. As in the story of the boy who cried "wolf!", the final variation is all the more surprising for diverging from a pattern that has been established within the narrative itself. In abstract terms, these jokes employ what is called an AAB[43] pattern structure, in which two or more examples of an event-type A are followed by an incongruous event B. For instance, the following witticism employs an AAB structure: "*George Washington couldn't tell a lie; Richard Nixon couldn't tell the truth; and Bill Clinton couldn't tell the difference*". Here, an A-type event is the use of the word "tell" to denote an act of verbal communication, while the final B-type event is the use of the same word to denote an act of mental differentiation. The joke suggests that Clinton is less truthful than Washington, more truthful than Nixon, but less discerning than either.

The AAB pattern is a structural feature of many songs in the Blues tradition. A typical Blues verse comprises a line (A) which is sung twice in succession, followed by a different line (B) which ends the verse. As in jokes, the final (B) can be a playful departure from the content of (A), as in this verse from Tab Benoit's "Garbage Man"[44]:

> *My Baby, she run away with the garbage man,*
> *Yeah, My Baby, she run away with the garbage man,*
> *Well I need you so bad, so you can empty my garbage can.*

But this music is called *The Blues* for a reason, and most AAB verses are not humorous and joke-like. It takes more than a surprising divergence from A to B to make AAB funny. Humour theorists insist that B must seem incongruous when following A, yet be resolvable as meaningful and appropriate in its relation to A. The above AAB verse can thus be understood as a humorous script variation in the mould of the GTVH. Though we trigger the familiar script of failed romance, we later realize that the singer does not pine for his lover, but for the lover's new partner, not because he misses the comforts of a steady romance, but because he misses the convenience of regular garbage collection.

When used as a rhetorical strategy, the AAB pattern allows a speaker to gain some positive momentum in the run up to a negative put-down, at which point a killer B punch

is delivered. Perhaps the most memorable use of the AAB pattern in this vein occurred during the 1988 U.S, presidential elections[45], when the following exchange took place in the vice-presidential debate:

Senator Dan Quayle:	I have as much experience in the Congress as Jack Kennedy did when he sought the presidency …
Senator Lloyd Bentsen:	Senator, I served with Jack Kennedy, I knew Jack Kennedy, Jack Kennedy was a friend of mine. Senator, you are no Jack Kennedy.

You almost have to feel sorry for Dan Quayle here, as Bentsen counters Quayle's altogether reasonable claim to have amassed sufficient experience for the presidency with an unstoppable roundhouse punch. Bentsen squeezes in an additional A element to lengthen the buildup to his put-down, reducing both the social distance and the conceptual distance between himself and Kennedy with each step, so that each successive affirmation just adds increased force to the negation when it finally comes. Quayle can only respond by noting, weakly, "that was really uncalled for, Senator". To appreciate the contribution of the AAB pattern here, just consider if Bentsen would have landed such a resounding blow with the simple response ""but you're not Jack Kennedy".

Recent work by cognitive scientists Jeffrey Loeenstein and Chip Heath shows that the AAB pattern in stories – which they call the *repetition-break plot structure*[46] – is considered more enjoyable by readers than the equivalent AAA (unbroken repetition) or ABC (no repetition) patterns. Many narrative jokes use explicit repetition to enforce an AAA pattern in the minds of an audience, so that AAB repetition-break comes as an incongruous and potentially humorous surprise. There are whole genres of jokes involving a priest, a rabbi and an imam; or an Irishman, and Englishman and a Scotsman; or a trio of nuns, hookers, husbands or some other stock characters, in which two of the three act somewhat predictably while the zany actions of the third provide the humorous departure. But there are many more jokes that do not rely on explicit repetition. Yet these jokes might still be said to obey an (AA)B pattern if prior familiarity with A and a superficial similarity between A and B causes the AA lead-in to be tacitly assumed. This

implicitness is also a factor in the creative variation of familiar phrases, but even this kind of variation can benefit from the use of explicit AAB repetition. The AAB pattern gives an audience the opportunity to compare and contrast a novel variation to its more familiar norm, so that the meaning of any substitutions can be fully appreciated. Moreover, the explicit use of repetition in an AB or AAB pattern can make the relationship between variation and norm all the more apparent, as in the following triad:

When in Rome, do as the Romans do.

When in Athens, do as the Greeks do.

When in Paris, do as the Germans do.

The A-script here is the standard "when in a city, do as the locals do". The B-script is altogether more subversive, "when in a conquered city, do as its military occupiers do". The explicit AA repetition and B divergence is not strictly needed here, since the first A is a cliché through and through. Nonetheless, the repetition does remind the audience of some received wisdom in need of a cheeky make-over. It may be appropriate to act like a true local, but who wouldn't prefer the freedom to act like a debauched invader instead?

The final B line of the above triad subverts the A cliché that spawned it, but many variations simply *clone* a convenient norm to lend it a modicum of freshness and contextual fit. For instance, the "When in Athens" variation in the second line is more an attempt to localize the familiar "Roman" norm than to wring any humour from it, since it adds little but contextual detail to the original, and fails to generate any kind of non-obvious incongruity, semantic tension, or surprise. We'll return to the topic of lazy variation in chapter seven, where we'll discover why linguists use the intriguing label "snowclones" for these rather obvious forms.

Appropriately Improper

The sociologist Erving Goffman coined the phrase "accurately improper move" to describe how the charades that shape our day-to-day social interactions – what Goffman called "expression games" – can be deliberately undermined with a creative action that is, at once, improper *inside* the charade, but sensible and proper when viewed from *outside*.

In this light, Lloyd Bentsen's memorable put-down of Dan Quayle can be seen as an accurately improper move: Quayle had, after all, merely hinted that JFK might be an apt vehicle of comparison for himself, and did not go so far as to make his comparison explicit. In this sense, Bentsen's response is improper, or as Quayle described it, "really uncalled for". Nonetheless, Bentsen needed to neutralize even the hint of a comparison to JFK, justifying his rhetorically accurate if socially improper retort with the defence "You are the one that was making the comparison". In other words, Bentsen accurately saw Quayle's expression game for what it was, and improperly ended the charade.

If our aim is to show the unreasonableness of unearned praise, half-baked opinion or habitual expectation, then like Bentsen, our most creative move is also an "accurately improper" one. Such a response achieves what Elliott Oring calls an "appropriate incongruity", a B where an A is expected to show these expectations to be nothing more than the rules of a game we can choose not to play. However, the sociologist Thomas Scheff suggests that Goffman's simple prescription may be hard to fill[47]:

> "Devising a phrase or sentence that is 'accurately improper' in this sense would seem to be a formidable task. One must first hit upon an important commonly held assumption, then exactly counter it with an equally plausible assumption"

Ironically, if Scheff is right, the key to devising a creative and "accurately improper" insight is an ability to recognize, and duly hit upon, "an important commonly-held assumption". In language, the names we give to these widely-accepted truisms are also commonly perceived as antonyms for creativity itself: the *cliché* and the *stereotype*.

In our received wisdom, clichés are never bubbling or energetic, fresh-faced or innovative, surprising or clever; rather, the poor devils are inevitably flyblown, dust-covered, tired, jaded, stale, lifeless, pale or limp. Nonetheless, just as we can't have surprise birthday parties without birthdays, excitement without boredom, pleasure without pain, or relief without anxiety, we can't properly conceive of a creative departure from the norm without a well-developed conception of what is conventional and normative and, well, *boring*, in language. If anything, stereotypes get an even worse press than clichés, perhaps because we are prone to stereotype our stereotypes as prejudicial

and small-minded, just as we are wont to condemn clichés with more clichés (or, in the words of critic Christopher Ricks[48], with cliché-clichés such as "flyblown", "stale" and "limp"). The A of the AAB pattern is every bit as important as the B, but is condemned to play a largely unsung or misunderstood role in the workings of creative variation. Nonetheless, clichés and stereotypes have a fundamental role to play in linguistic creativity, and so we shall do our best to redress the imbalance in the next chapter.

Notes and Further Reading

[1] The verdict from the *West-End Whingers* blog was "Dull. Like watching paint dry, and as we all know, paint never dries". *http://westendwhingers.wordpress.com/2010/03/02/review-love-never-dies-Adelphi-theatre/*

[2] Newell, Shaw & Simon (1963).

[3] For a technical analysis of IBM's *Deep Blue* system, see Campbell *et al*. (2002).

[4] Perkins (2001:46–96).

[5] Everdell (1997:265).

[6] Boden (1990, 1999). For a more formal treatment, see Wiggins (2006).

[7] Ritchie (2006) offers a probing critique of Boden's transformational hypothesis.

[8] See Douglas Hofstadter *et al*. (1995) for a good cross-section of Hofstadter's research.

[9] Quoted in *Newsweek*, January 30, 1956, p. 56.

[10] Quoted in Squire (2004:54).

[11] See Douglas Hofstadter (1997) for an entertaining tour through the constraint-laden processes of creative translation.

[12] Guilford (1950) gave renewed impetus to the field of creativity research with a paper simply titled "Creativity". Coincidentally, Alan Turing also published his seminal paper on AI in 1950. Guilford (1967) outlines the structure-of-intellect (SI) theory, in which divergent production is identified as 1 of 6 key intellectual processes.

[13] Turner & Fauconnier (2002).

[14] Ann Richards, July 18, 1988. Keynote address to the Democratic National Convention.

[15] See Hofstadter and Mitchell (1995) for a description of the *CopyCat* project.

[16] The March 2008 issue showed a picture of the governor with the caption *What Obama, McCain, Clinton and the rest can learn from Arnold Schwarzenegger*.

[17] "The Governator" was the title of an article about Schwarzenegger in *The Guardian* newspaper, on Friday 8th August 2003.

[18] Crevier (1993).

[19] McCarthy (1999).

[20] See Koestler's masterful 1964 book *The Act of Creation*.

[21] Attardo & Raskin (1991).

[22] Schank and Abelson (1977).

[23] Chafe (2007).

[24] Raskin (1985).

[25] For a skeptical view of the explanatory power of script conflict, see Veale (2004a).

[26] Norrick (1986).

[27] Suls (1972).

[28] Attardo & Raskin (1991).

[29] Oring (2003).

[30] Goffman (1961) notes that "As every psychotic and comic ought to know, any accurately improper move can poke through the thin sleeve of immediate reality".

[31] Ritchie (1999).

[32] Attardo (1994:144) is careful to point out that "the 'resolution' of a joke is not supposed to get rid of the incongruity, but to co-exist and accompany it". So resolution does not explain away incongruities, rather it enriches them with meaning.

[33] The comedian Stewart Lee (2010:197) describes this means of joke production as *The Pull Back and Reveal*: "the first part of a sentence creates a certain set of expectations … which is then reversed in the second half of the sentence as the frame of the picture, so to speak, widens to include details that, had they been evident initially, would have clarified the situation immediately."

[34] Hofstadter (1997), Hofstadter & Gabora (1989).

[35] Though see Ritchie (2003) for a counter-balanced, critical view of the GTVH.

[36] Attardo *et al*. (2002).

[37] This is an anecdote widely told about Wolfit. For instance, see the Daily Telegraph on April 12, 1993: "The too, too divine days of Sir Donald."

[38] *The Economist* letters page, March 25th, 2010. See *www.economist.com/node/15767227*

[39] See Paulos (1982:97) for a less "graphic" graphical interpretation.

[40] For an introduction, see Saunders (1980).

[41] Paulos (1982: 75 – 97).

[42] Quoted in Simon Hoggart's column in The Guardian newspaper, Nov. 28, 2009.

[43] Rozin *et al*. (2006).

[44] See *http://www.lyricstime.com/tab-benoit-garbage-man-lyrics.html*

[45] The full text of the October 5th, 1988 debate is available online from the *Commission on Presidential Debates* at *http://www.debates.org*

[46] Loewenstein & Heath (2009).

[47] Thomas Scheff (2009:185–198).

[48] Ricks (1980:54).

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