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This is a contribution from *Producing Figurative Expression. Theoretical, experimental and practical perspectives*.

Edited by John Barnden and Andrew Gargett.

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# Introduction

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## 1. Motivation for the volume

This volume contains a selection of recent work on the production of figurative language and other forms of figurative expression. This is with the intent of helping to set right an imbalance in the amount of work there has been on production as compared to the larger amount on the understanding of figurative expression. The terms “production”, “figurative” and “expression” here all need some comment. By “figurative” we mean involving the use of a device such as metaphor, metonymy, irony, hyperbole, or understatement. A large majority of the chapters in this volume focus on metaphor, but a substantial minority focus on irony and sarcasm. Hyperbole is solidly represented, being a central topic of two chapters and featured in two others. One chapter takes a broad view across many figures, however. The individual chapters are summarized in the next section of this Introduction.

Devices such as metaphor do not occur merely in language. We use “expression” to allow for non-linguistic items such as hand gestures, pictures, diagrams, consumer artefacts, musical pieces, dances, and so forth. Within this range of non-linguistic possibilities, the chapters in our volume only in fact address the visual/spatial modes such as pictures and consumer artefacts. Nevertheless, we would hope that some of the considerations carry over to other modes such as gestures and music.<sup>1</sup>

In broadening from language to other forms of expression, we are influenced by the view, held by many modern scholars of phenomena such as metaphor, especially in the field of Cognitive Linguistics (see, e.g., Geeraerts & Cuyckens 2007), that the phenomena to be addressed are fundamentally mental/emotional/

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1. So for us a figurative painting, sculpture, musical piece or other artwork would be one that was (say) metaphorical. There is a clash here with the use of “figurative” as applied to an artwork to mean that it more or less realistically depicts something such as a person or a landscape, and does so for the sake of sincerely showing that item, not using the item as (say) a metaphor for something else. This notion of figurativeness is, unfortunately, diametrically opposite to the one used in our area.

body-internal ones, with the external manifestations in language, pictures, etc. being derivative from the internal phenomena.<sup>2</sup> So, for instance, talking of one person being “above” someone else in a power structure happens ultimately because it is convenient for us to think or conceive of power relationships in terms of relative vertical position in physical space; and this way of thinking or conceiving can also be manifested in a picture, diagram, hand gesture, facial expression, dance, etc. (See, e.g., Cienki & Müller 2008, Corts & Pollio 1999, Forceville 1994, 2006, Forceville & Urios-Aparisi 2009, Kappelhoff & Müller 2011, Kennedy et al. 1993 and McNeill 1992, 2005 for work on figurativeness, notably metaphoricity, in visual media and gestures.)

By “production” of expression we mean the creation of figurative utterances (spoken, written or signed), gestures, paintings, pieces of music, and so forth. We include also the creation of *thoughts* or other cognitive/emotional items that are couched metaphorically or otherwise figuratively in one’s brain, even if not externalized in communication. And even when externalized, this may not primarily be for the sake of communication to others on a given occasion. One may, for instance, make a certain facial expression or bodily gesture as part of experiencing an emotion, even when one is in private.

As a final comment on what we assume about production, we do not assume across the board that the producer is conscious of including figurative devices, though it would be natural to assume there is such consciousness in some type of production, especially the considered and time-consuming crafting of artworks and artefact designs. (See Hidalgo-Downing & Kraljevic Mujic 2020 on metaphorical creativity in discourse, artworks, etc.)

The volume is multidisciplinary, with an emphasis on linguistics, psychology and artificial intelligence. This reflects our wish to promote the further study of figurative production across relevant disciplines. Given this dimension of breadth, combined with breadth across different figurative devices and breadth across different modes of expression, the volume cannot hope to be comprehensively representative of contemporary research on production. That ambition would have required multiple volumes on the same scale, or a very fat handbook indeed. In various senses there has been a large amount of work on production of figurative expression (mainly in language). This is so not just within artistic areas such as creative writing

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2. This does not mean to say that understanding the utterances, etc. produced by others cannot in turn create new or modified long-term mental representations, procedures, etc. in oneself, which then affect one’s own productions. It’s a two-way street, or better a tangle of two-way streets. The question is whether metaphor, etc. fundamentally arises from the nature of the minds joined by the streets, from the nature of the streets, or from both.

and painting, where the careful crafting of figurative elements is central. Looking outside those areas, we have for instance the great attention that translators even of mundane language must pay to figurative devices in order to produce natural-sounding utterances in the target language. As a second example, a standard type of work in the study of metaphorical language is to examine the patterns of metaphor usage in large bodies of recorded language, partly to see how it is influenced by such factors as genre (scientific writing, news reporting, general conversation, etc.), the political bias of the speakers or sources, or the historical period in which it lies.

A further consideration is that much work on language within philosophy and language pragmatics (notably as centred on the work of Grice, speech-act theory, and Relevance Theory: see, e.g., Sperber & Wilson 1995, Ward & Horn 2004) brings in questions of what meaning the speaker is trying to convey, what she is trying to avoid saying explicitly – or can afford not to bother to say explicitly – what speech act such as stating, requesting or commanding she seeks to perform, and so forth.<sup>3</sup> Such research is in that sense about production even when the main focus of the work is to develop a theory stipulating the meanings that given utterances have or a theory accounting for how hearers uncover/construct meanings of utterances they receive.

There has also been much discussion of the broad purposes of metaphor, irony, etc., such as economy of expression, meaning enrichment, vividness, emphasis, de-emphasis, catalysing of conversation, objectivity enhancement, extolment, persuasion, misdirection, implicit communication and elicitation of emotions and evaluations, (im)politeness, ingratiating, self-protection, identification-as, in-group maintenance, mastery demonstration, tension reduction, teasing, and humour (see Colston 2015 for an extended and wide-ranging treatment, and also Gibbs 2000, Gibbs et al. 2002, Katz 1996, Popa-Wyatt, this volume, Roberts & Kreuz 1994, Steen 2008). Such purposes are a central issue in figurative expression production. There has also been work in psycholinguistics studying what precise forms of figurative expression people prefer to use in different circumstances. One main focus here has been on whether people prefer to use a metaphor of form A is B versus a corresponding simile of form A is like B depending on context and what A and B are (see, e.g., Chiappe & Kennedy 2001).

As a final illustration of work on figurative production, there is a large and growing body of research on “bidirectionality” or the apparent tendency of people to move mentally from metaphor targets to sources (as well as from sources

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3. Throughout the rest of this introduction we will stick to the common practice of using “speaker” metonymically to mean “speaker or writer or other producer” and correspondingly “hearer” to mean “hearer or reader or other recipient.”

to targets). An example is that of experiencing increased bodily warmth when hearing about affection (cf. the commonly used metaphorical view of affection as warmth) or in feeling a USB stick to be physically heavier when it contains more important information (cf. the familiar metaphorical view of importance as weight) – see, for example, Chan, Tong, Tan & Koh (2013), Denke, Rotte, Heinze & Schaefer (2016), Dong, Huang & Zhong (2015), He, Chen & Li (2018), He, Chen, Zhang & Li (2015), Landau, Meier & Keefer (2010), Lee & Schwarz (2012), and Schneider, Parzuchowski, Wojciszke, Schwarz & Koole (2015). The mental operations involved could be said to be a form of internal production of metaphorical expression. An example would be someone’s internal production of the thought that one USB stick is heavier than another when she is told that the former contains more important information than the latter. However, in most cases the research appears to have focussed not on the production of such focussed, articulated thoughts but instead merely on the stimulation or facilitation of sensations (warmth, smells, etc.) and the activation of brain regions that may be related to such sensations or similarly to motor actions relevant to the source domains at hand. Indeed, not all the studies clearly support internal production of metaphorical expression, as opposed to mere stimulation of relevant source items. For instance, a study by Lee and Schwarz (2012) suggested an internal step from suspicion to fishy smell, relating to the metaphorical use of “*being/smelling fishy*” to mean being worthy of suspicion. But what was demonstrated was merely participants’ heightened sensitivity to a fishy smell in, say, a test tube when they were led to think that the experimenter was acting suspiciously. It was not that the experimenters or their activities themselves smelled fishy to the participants!

Now, despite all the work impinging on production, including extensive treatments such as that of Colston (2015), it is fair to say that, looking at the research landscape as a whole, research on what the speaker or other producer is thinking or doing in the production of figurative expression has been considerably less extensive than the amount of research on what the hearer or other receiver is thinking or doing in understanding figurative expression. To give flesh to this impression of relative imbalance in the attention given to production and understanding, we can make some specific illustrative observations.

First, much contemporary metaphor theory and investigation is based on the notion of *mappings* between the source subject matter and the target subject matter of a linguistic utterance (Lakoff & Johnson 2003). For example, in the metaphorical sentence “*There is a roaring torrent of ill-gotten money flowing through Western banks*” the target subject matter is money and transfers of it, and the source subject matter is (arguably) water and its movements through a landscape. One can theorize that there is a mapping from water to money, from moving masses of water to processes of money-transference, from locations or receptacles

where water can lie to money-handling institutions such as banks, and so forth. It would generally be supposed that we know such mappings as part of our general experience with English and life. On the other hand, in suitable circumstances we can invent them in the course of understanding a sentence. There are prominent accounts of such invention during understanding (notably in Bowdle & Gentner 2005) and we can presumably in principle invent them during production as well. But for simplicity here, we will assume that the speaker and hearer of our money/torrent example are already familiar with the mappings before producing or encountering the sentence. Now, what has been most discussed in cases such as this is the hearer's side of the matter – how a meaning concerning money transfer arises for the hearer from the sentence through use of the mappings to “translate” the source-side scenario about water movement that is literally described by the sentence to a target-side scenario about money transfer. What is much less commonly discussed is exactly how, why and when a speaker would start with a scenario about money transfer and use the mappings in the target-to-source direction to construct a source-side scenario that fits it – as opposed to not using any metaphorical mappings, or to use some alternative ones that might be available, for a view of money as something other than water; or what leads the speaker to use a particular water-noun such as “*torrent*” versus another such as “*river*,” or to include a particular qualifier such as “*roaring*”. It mainly just seems to be tacitly assumed that speakers successfully do such things in a reasonably principled way.

Equally, under the class-inclusion or categorization theory of metaphor (Glucksberg 2001), by far the strongest focus is on understanding. When faced with, for instance, the classic example of “*My job is a jail*,” the hearer is theorized to find a category *jail*\* that includes both real jails and jobs, postulates that the speaker's job is in *jail*\*, and therefore derives particular properties of that job. But it is much less discussed how the speaker goes from some particular thing she wants to convey about the job and then chooses an appropriate source-side category such as jails – as opposed to just expressing the point literally or using some other different source category – or how a speaker might creatively come to utter some variant such as “*My job is a high-security prison with lots of isolation cells*.”

Another illustration of the production/understanding imbalance can be found in a branch of irony research. This branch attends to ironicity markers or signals (Kreuz & Roberts 1995, Pexman 2008; additional references in Burgers & Steen 2017) such as sarcastic intonation, special lexis used (e.g., the common use of “*Sure*” or “*Great*” as an interjection starting an ironic statement), and hyperbole (e.g., use of “*a genius*” rather than just “*a clever person*” in ironically saying “*Sure, Mike's a genius*” when in fact it has only been claimed that Mike is clever). But the focus is strongly on how such clues are to be used by a hearer to help decide whether an utterance is ironic, rather than on speaker processes leading to

their inclusion or otherwise (but see Kreuz & Johnson, this volume, on this matter). This is despite the fact that the prominent theoretical approaches to ironic communication – the pretence and echo-based approaches (Clark & Gerrig 1984, Currie 2006, Kumon-Nakamura, Glucksberg & Brown 1995, Popa-Wyatt 2014, Wilson 2006, Wilson & Sperber 2012) – are, ironically enough, at least ostensibly about what the speaker is doing: pretending or echoing, in certain senses.

Again, in AI, work on figurative language has focussed mainly on understanding – of metaphor, primarily, with metonymy in a decent second place, and with increasing attention to irony – although there have long been efforts also on metaphor generation. Metaphor generation is a strong interest in the “computational creativity” community (see particularly Veale, this volume), whereas recent computational linguistic work on metaphor has largely been on detecting, categorizing and roughly paraphrasing metaphorical utterances rather than on producing them. A relatively representative corpus exhibiting this tendency can be collected from the series of workshops held at the North American chapter of the Association for Computational Linguistics (NAACL) since 2013. Of the fifty or so papers at the five meetings that have been held so far (in 2013, 2014, 2015, 2016, 2018), only the following submissions focused on production (the last 2 were not strictly on computational processing of metaphor): Veale (2014), Veale (2015), Veale (2016), Gero and Chilton (2018) and Skalicky and Crossley (2018).

However, a notable early system for metaphor processing (MIDAS: Martin 1990) did both production and understanding; it sought to answer metaphorically couched questions about the Unix operating system (questions such as “*How do I kill Emacs?*”, Emacs being a document editing program) and sought to couch replies in terms of the same metaphorical views as the questions.

These illustrations of a production/understanding imbalance are just some among many that one might give. The motivation of our volume is to help stimulate the redressing of the imbalance by presenting a range of illustrative, recent work on the production side. Some of the contributions delve explicitly into production processes, while others serve more to draw attention to forms of figurative expression that raise pressing issues that need to be addressed by detailed accounts of production processes.

This motivation is an ambitious one in the sense that the imbalance is not just accidental or a result of vagaries of academic history, fashion or prejudice. Rather, it has arisen from genuine research obstacles. For instance, while with sufficient care one can get experimental participants in a psychological study to undertake, in a reasonably natural way, the understanding of figurative utterances or other forms of expression by presenting them with such items, it is much less clear how to get participants naturally to produce figurative items. One could tell the participants to produce them, but the conscious deliberation involved might

lead to processing that is greatly different from that which would normally arise in ordinary discourse; and the study would be hostage to participants having an understanding of the type of figurativeness of interest (metaphor, irony, etc.) that is close enough to the experimenter's. Also, the problem is amplified if one wants the participants to produce items of a controlled sort, for instance with a particular syntax or using a particular source subject matter for a metaphor. (Two of the chapters in the volume – by Colston and by Katz – explicitly seek to circumvent these methodological problems.)

Somewhat similarly, in AI, one can seek to devise a system that can understand, or can learn to understand, figurative utterances, pictures, etc. when the system happens to encounter them. But, difficult though devising such a system is, there are even more difficulties in devising a system that produces or learns to produce figurative items, as then one meets such questions as why and when to produce them, what familiar metaphorical conceits to choose from a range of available ones, and so forth. Parallel questions do not arise on the understanding side, where the system is stuck with understanding the particular metaphors at the particular times they come along, the only leeway being in whether to ask for clarification, how deeply to understand, or indeed whether to bother to understand at all.<sup>4</sup>

As for linguistics, at least of the more theoretical or cognitive sorts, it is natural for there to be a focus predominantly on linguistic utterances as objects already produced and thus to give priority to investigating how they convey meaning to a reader/hearer – or even just to investigating what meaning they convey, without looking at the processes for either discerning or constructing that meaning, let alone processes for going from speaker/writer's meaning to linguistic utterance. Of course, linguists (and others) interested in certain topics such as language learning must attend to production processes.

This is not to say, of course, that study of already-produced expressions, where one has had no control over the production, does not illuminate production. Several of the chapters in this volume gain insight into production by looking at linguistic corpora, for instance. There are particular difficulties in using corpora in studying figurative language, because of the difficulty of comprehensively and systematically finding instances of the targeted type of language in a large corpus (see, for example, Colston 2015: Ch.5, where some work-arounds are also discussed).

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4. Of course, human understanders also have such leeway. We should avoid the mistake of assuming that in all discourses a hearer needs to derive a deep, or indeed any, understanding of a particular utterance by a speaker – it all depends on how interesting or useful the hearer thinks the speaker's pronouncements may be!



## 2. The chapters

Here we summarize the content of each chapter. We have emboldened words such as “metaphor” and “irony” in each summary to enable the reader to see quickly which chapters deal with which types of figurative expression, with chapters themselves grouped on other grounds, as follows.

The first and second groups are for chapters whose main focus is to present, survey or provide methodologies for empirical studies whose ultimate aim is to illuminate cognitive processes of production. The empirical methods are various but include psychological laboratory experimentation and linguistic corpus analysis. The first of the two groups gathers studies whose main focus is production of metaphor, but note carefully that other types of figuration may play an important role as well. The second group is for chapters with a joint, broader or otherwise different focus; for example, they are focussed on a combination of metaphor and another figure, or on hyperbole or irony, or on figurative language without making metaphorical aspects explicit.

The third group is for empirical work or theoretical analysis that is aimed mainly at exploring the role of figurative production in some specific application area. The areas addressed are product design, discussion of psychological harm, and language learning.

The fourth and final group is both for theoretical analysis with no specific application area in mind and for cognitive or computational modelling of figurative production.

Necessarily, the boundaries between groups are fuzzy: a chapter in a particular group can contain work of another group’s type as well. And readers with specific interests may well focus on a set of chapters that cut across our categorization. For instance, one important theme is metaphor outside language. This features mainly in the chapters by Cila & Hekkert, Kennedy, and Ojha & Indurkha. Computational modelling of production appears in Ojha & Indurkha as well as in the fourth group.

### 2.1 Section 1: General empirical studies, with main focus on metaphor

Albert Katz surveys a string of studies he has conducted that involve figurative-language production, both for the purpose of studying production itself and for generating material for use in comprehension studies. A guiding principle has been (as in the Colston chapter, see below) a desire for a good balance between ecological validity and experimental control, by using suitably designed laboratory techniques. The studies support Katz’s contention that production procedures in laboratory experiments can provide novel insights that have not emerged from

nonexperimental approaches or from reception-based experiments (where participants are just confronted with already produced linguistic stimuli). The studies surveyed are too numerous and varied to summarize here, but, as one example, in a recently started programme of work he has been studying people's preferences as regards the semantic spaces used in the **metaphors** they produce. They have explored whether producers are affected not only by the semantic distance between the concepts brought together in the metaphor, but also by the "density" of the spaces. A given concept used in a metaphor, such as the source concept *balloon* in "*Joy is a balloon*," might be semantically close to relatively many or relatively few other concepts in the source space of physical objects. Findings indicate that people prefer to generate (and find it easiest to comprehend) metaphors with source concepts that come from "sparse" spaces. Somewhat earlier work mentioned in the chapter provides experimental evidence, from metaphor production tasks, that people do have knowledge of conceptual metaphors such as LIFE IS A JOURNEY, something that has been contentious and difficult to study experimentally. Other studies mentioned in the chapter look at such matters as what discourse ecology invites metaphor or sarcasm production, and how production is affected by the genders of the speaker and hearer. Some of the work involves gratitude acknowledgments, another point of resonance with Colston's chapter.

John Kennedy exemplifies and discusses the production by blind people, even when congenitally so, of drawings that are of real or potentially real objects (cars, lakes, ...) but that contain **metaphorical** devices, such as lines to indicate wind or pain in a hand, and inventive distortions of the shape and position of car wheels to suggest motion, braking or stationariness. The devices are in general well understood by the sighted. Kennedy's work highlights the importance of considering tactile as well as visual experience as the basis for metaphorical devices in pictures, and the possibility that this is important for the sighted as well as the blind. This chapter therefore continues the general themes of the multimodality of metaphor and its primary residence being inside us rather than in our external expression, while also affirming that pictures are relevant to the blind as well as to the sighted. Kennedy ends with an important sociocultural point that major museums are beginning to take note of blind people's facility with pictures by, for instance, including raised-line versions of them.

Andreas Musolff theorizes that, and empirically studies how, **metaphor** production and interpretation are intricately connected as communicative acts. Interpretation can lead to new and possibly disruptive metaphor versions, and this can be construed as the involvement of a strong production element in metaphor interpretation. The empirical evidence that Musolff adduces is corpus data and (cross-linguistic) questionnaire-derived data about body-based metaphors in politics, notably the use of the human body as a source to describe a country

geographically or abstractly. We see the interconnection of production and interpretation as a fundamental issue to be given more attention in future research, and we expand on this point in the last section of this Introduction.

Amitash Ojha and Bipin Indurkha present a theoretical, experimental and nascent computational exploration of the role of perceptual similarity in producing visual **metaphors**. They analyse advertisements to argue that relatively superficial perceptual similarity is used in various kinds of visual metaphors appearing there (and presumably in visual metaphors in other genres of expression). Ojha and Indurkha hypothesize that such perceptual similarity plays the important role of inviting the viewer to consider deeper metaphorical interpretation of an image. They report on two experiments indicating that perceptual similarity is intuitively recognized and that shape-based perceptual similarity is preferred in representing metaphors pictorially. Finally, Ojha and Indurkha propose a computer program to generate visual metaphors based on conceptual similarity but aided by algorithmically-determined perceptual similarity.

## 2.2 Section 2: General empirical studies – other

Herb Colston provides us with two advances: (a) a theoretical and experimental study of production of a certain type of language that is often figurative, and (b) a methodology for getting experimental subjects to produce examples of language. This methodology is applied to the particular type of language in (a), but is of general applicability to production tasks (and not just linguistic ones, we might add). The language type in (a) is gratitude acknowledgments such as “*anytime*” or “*you’re welcome*” that you might utter when someone thanks you. Colston uses these to exemplify a broader range of formulaic language that has received relatively little experimental study. The main type of figurativeness in gratitude acknowledgments is **hyperbole**, as in typical uses of “*no trouble at all*” and “*anytime*” (which is hyperbolic in that the speaker is not willing to provide the service literally at *any* time). The methodology in (b) is to present participants with carefully crafted, short written stories placing them in situations where they had recently granted a favour to someone who has now thanked them. Participants were asked to consider and write down what they would actually say in response to the thanking. Thus, the situations were carefully controlled, but the participants were allowed complete latitude in responding. This is a compromise between studying completely natural, found interchanges – where it would be difficult to find enough experimental control to isolate and study variables of interest – and a tighter experimental paradigm where participants are more constrained in what they can respond – in which case the experiment is prey to artificial interference with what participants

would in fact normally do. Thus, the methodology is intended to provide an acceptable compromise between ecological validity and experimental control (as in the Katz chapter, see above).

Francesca Ervas considers persuasive uses of **irony** as a form of argumentation. She asks, given the risk of misunderstanding that irony naturally carries, why a speaker who wants to persuade someone of something would take this risk. The hypothesis of the chapter is that the ironist does not simply want to persuade, but wants to persuade in a particularly forceful way: the ironic argument has a specific emotional charge which cannot be found either in literal arguments or in other arguments containing “suggestive language”. Ervas reports a pilot experimental study that lends support to the hypothesis, and also explores the difference between speakers’ use of **sarcastic** irony and their use of non-sarcastic irony, and between their use of negative irony (irony that criticizes) and their use of positive irony (irony that praises). The study also shows speakers and hearers assigning different affective charges to the same ironic comment.<sup>5</sup>

Rachel Giora’s chapter continues the exploration and confirmation of her Defaultness Hypothesis, which is (roughly) to the effect that words and constructions have default meanings/interpretations that come to mind quickly and unconditionally (e.g., regardless of contextual appropriateness). The Hypothesis leads to various predictions about the production and comprehension of utterances. The chapter’s main focus here is a prediction about production, concerning resonance between close-by segments of a discourse: if a prior and/or upcoming utterance does resonate with a given utterance, it will resonate with the latter’s default rather than nondefault interpretation, irrespective of that interpretation’s degree of figurativeness, novelty or contextual fit. The chapter concentrates on resonance with **metaphorical** and **sarcastic** interpretations of sentences of a certain sort. These sentences involve a variety of negative constructions, such as in “*You are not my boss*” and “*He is not the sharpest pencil in the box.*” It presents corpus studies that support the resonance prediction.

Loes Koering provides evidence for the idea that one tool speakers have for guiding hearers to a figurative interpretation of an utterance is definiteness marking. Experiments showed, in particular, that figurative expressions containing a pragmatically unlicensed definite article gave rise to highly **idiomatic** meanings, ones that, moreover, tended strongly to be non-transparent (i.e., difficult to relate to the literal meaning of the expression). The idea is that, when a hearer is presented

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5. And it is not clear to us whether current theories of irony are equipped to cope with this affective divergence between speaker and hearer, partly because the theories do not have clearly separated, well-developed subtheories of production and comprehension.

with, for instance, “*John needs to wash the pig*” in a context that isn’t about pigs, he is both unable to find an existing pig as referent in the discourse and prevented by the definite from introducing a new one. As a result the hearer instead tends to map the pig-washing as an unanalysed unit onto a unique event relevant to the context, with little regard to any transparent correspondence of aspects of this event to a pig and its washing. By contrast, when an indefinite article is used (as in “*John needs to wash a pig*”), hearers have a somewhat greater tendency to construct transparent meanings. While the experiments in the chapter are directly about comprehension rather than production, one can assume that speakers have some sensitivity to how they themselves or a hearer would take an expression, so that in inventing a new figurative expression they can use definiteness to guide hearers to figurative understandings.

Roger Kreuz and Alexander Johnson provide a review and assessment of the current state of literature on factors (situational, pragmatic, cultural, ...) that affect whether speakers use **irony**, on features that can help a hearer identify an utterance as ironic, and (consequently) features that speakers can confer on their utterances to try to make them detectable as ironic. The chapter covers computer-mediated communication (emails, Twitter posts, etc.) as well as more traditional forms of language. Amongst the issues discussed in the chapter are the amount of common ground between speaker and hearer that the speaker perceives as existing, discourse goals of the speaker, the genders of speaker and hearer, cultural differences, language differences, lexical cues such as interjections, **hyperbole**, facial and manual gestures, tone of voice, and speakers’ personality and cognitive ability. In the case of computer-mediated communication, emoticons, emojis, special punctuation and hashtags are additionally discussed. Also, work on automated detection of irony is discussed, partly in the context of sentiment analysis (detection of emotions, evaluations, etc.). Here the potential importance of taking note of particular authors’ histories of use of terms is noted. The chapter ends with a mention of unanswered questions such as how to distinguish **sarcasm** from non-sarcastic verbal irony, whether this is even a valid enterprise, and the nature of the relationship of irony to phenomena such as banter and teasing.

### 2.3 Section 3: Empirical and analytical studies aimed at specific applications

Nazlı Cila and Paul Hekkert discuss the generation of **metaphors** in product design. One of their examples of such a metaphor lies in the “*Excalibur*” toilet brush. This looks much like and is to be handled much as a sword – where the sword is further suggested by the name Excalibur (the famous, magical sword in the King Arthur legends). All this combines to encourage the idea that the brush

superbly enables one to defeat the “enemies” that may lurk in a toilet. This example shows also the cooperation between linguistic and tactile metaphor, and nicely brings out the rich cross-modality of metaphor in even the most mundane areas of real life. Cila and Hekkert discuss various dimensions of the product-metaphor producer’s task, provide a general framework for this activity, and offer metaphor producers some guidance on creating more effective and aesthetic metaphors.

Fiona MacArthur addresses speakers’ production of **metaphor** in second languages (L2s) rather than in their own, first, languages (L1s). This matter has so far been examined very little in comparison with difficulties that people have in understanding L2 metaphor. Also, even the work on the production side has focussed on written at the expense of spoken language. The chapter is a start on filling these gaps and examines the metaphors used by L2 speakers of English in face-to-face interaction with L1 speakers (native speakers of English) or other L2 speakers. MacArthur considers the frequency of metaphor production, the general characteristics of metaphors produced, their conventionality, and some of the factors that prompt metaphor use. One finding was that inexact repetition of language forms may fossilize in L2 speech, giving rise to particular kinds of variation not found in L1 speaker discourse. On the other hand MacArthur also found indications that L2 speakers rarely relexicalize, explicate or challenge each other’s metaphoric productions in the way that L1 speakers do.

Susan Nacey explores **metaphorical** analogies produced in computer-mediated discourse by survivors of relationship abuse in talking about their experience. Survivors often produce such metaphor in an effort to make something that’s difficult to describe, or even to understand, clearer to others and/or themselves. The chapter’s analysis also discusses the ways in which survivors negotiate metaphorical scenarios and frames among themselves, with the negotiation generally being in a positive spirit and resulting in flexible adaptation of the metaphors. (This adaptive process resonates with that in Musolff’s chapter.) Examples of metaphors studied range from ones that are more familiar, such as metaphors where something bad is compared to a natural disaster, or emotional turmoil is compared to ocean waves, to ones that are more inventive, as when the gradually more encompassing nature of abuse is conceptualized as a frog in water that is slowly heated to boiling, or alternatively as a clock whose alarm starts off softly and gradually becomes shriller.

Sarah Turner, Jeannette Littlemore, Meera Burgess, Danielle Fuller, Karolina Kuberska and Sheelagh McGuinness provide an exploration of the ways in which **metaphors** are used by women who have suffered pregnancy loss (through miscarriage, termination or stillbirth) and by people who support them. Such metaphors can, to varying extents, help both the bereaved and the supporters make sense of and gain insight into the experiences. The chapter focusses on time-related meta-

phors, including ones that focus on the development of feelings over time. It was found that time tends to be reified, enabling it to be viewed as a gift or resource or in more animated terms as a healer or as a cause of hindrance. Bereaved individuals appear to have developed a distinctive personal relationship with time. When they adopt a moving ego perspective on time – i.e., metaphorically viewing themselves as moving along a timeline towards events – they exhibit a marked lack of agency in the ways in which they describe the movements. For some individuals, their experiences appear to have taken them outside linear time, and they report experiences of occupying a space outside the world and its time line. The chapter ends by discussing the implications of the findings for caregivers, who must tread carefully – they need to respect the different conceptualizations of time used by the bereaved and to realize that conflict between competing conceptualizations should be minimized.

#### 2.4 Section 4: Other theoretical analysis and cognitive or computational modelling

Francisco Ruiz de Mendoza Ibáñez regards metaphor, metonymy, irony, etc. as figures of thought and accordingly concentrates on the “cognitive operations” involved in production and interpretation, where the particular notion of cognitive operation he uses is one he has been developing in extensive previous work. He relates cognitive operations to basic figures of thought such as **metaphor**, **metonymy**, **understatement**, **overstatement**, **irony**, **paradox** and **oxymoron**. He then explores other figures of thought, traditionally studied in rhetoric and literary studies, as relatives of these more basic ones, thus connecting them indirectly to cognitive operations. These figures include further well-known ones such as **sarcasm**, **allegory** and **litotes**, but also ones with labels that are likely to be new to many readers, such as **anthimeria**, **anthonomasia** and **auxesis**. He makes advances on the question of constraints on figuration by applying his Extended Invariance Principle and the Correlation Principle more widely than before, and by putting forward a maximization principle as a constraint based on extreme resemblance (echoing) and/or contrast.

Stephen McGregor, Matthew Purver and Geraint Wiggins present a novel, computational, statistics-based model of **metaphor** that, while not initially developed with production in mind, shows considerable promise for production. The model is founded on projections of representations to each other, where the representations are mathematical vectors derived through complex statistical analyses of large-scale linguistic corpora or subcorpora. These projections involve defining context-specific subspaces of co-occurrence statistics in which metaphors can be modelled as mappings between congruent regions of semantic representations.

The authors also offer this methodology as an empirical implementation pointing towards a resolution of theoretical stances that can seem to be in tension with each other: one, as in cognitive linguistics, focussed on construing metaphor as a result of underlying cognitive processes; the other, as in some pragmatic accounts, focussed on figuration (and other related phenomena) as a product of the environmentally situated generation of ephemeral conceptual schemes. While there has been beneficial interaction between the two stances, the chapter offers a new route to incorporating insights from both.

Mihaela Popa-Wyatt expands upon a growing movement in the study of **hyperbole** to focus on its affective and emphatic qualities, rather than giving pride of place to its obvious exaggerative qualities. She shows through an array of examples that the key purpose of hyperbole is to express emphatically and richly that a target property differs in intensity from what was expected or desired, and through that emphasis to convey something of the speaker's affect about the situation. In this work, Popa-Wyatt uses a recent framework of analysing hyperbole (along with related figures) that has been presented by the philosopher Kendall Walton, based on distinctions between "explicit content," "assertive content," and "salient contrast."<sup>6</sup> Popa-Wyatt also considers the frequent phenomenon of the mixing of hyperbole with metaphor and with irony. She argues that, rather than such mixing being a matter of forming a genuinely compound figure as a mix of **irony** and **metaphor** does, the hyperbole acts in a more subtle way to "tinge" the communicative effects of the other figure.

Tony Veale picks up on an ongoing debate concerning so-called deliberate metaphors by highlighting instead the notion of a potential metaphor, in noting that many texts support metaphorical interpretations regardless of their authors' intentions. He builds on the deliberate/potential distinction to model the automated generation of metaphors as an opportunistic process, whereby potential metaphors are converted into deliberate **metaphors**. He argues that the distinction between potential and deliberate is mirrored in that between signs and symbols, and demonstrates how this understanding leads to a more nuanced basis for generating and interpreting metaphors on a machine. The chapter sets into this framework the wealth of work that Veale has done on metaphor generation, including a publicly available web service that users can prompt to create metaphors, a Twitter bot that continually generates metaphors, and a more specialized system that generates highly creative, metaphorical names for colours, grounded in the real world. The resulting rich, meaningful metaphors intelligently exploit cultural norms and

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6. We conjecture that her claims would carry over *mutatis mutandis* to other frameworks as well.



stereotypical expectations about all sorts of people and objects, these norms and expectations being mined automatically from large-scaled exploration of the web in some relatively simple but fruitful ways. The chapter also embraces the power of statistical methods for language analysis that have the effect of providing subtle contextualization of concepts and thereby of metaphors generated.

Note that computational modelling of figurative production also makes an appearance in the chapter by Ojha & Indurkha in Section 1.

### 3. Figurative production in areas not covered by this volume

While past work dealing with the production of figurative language is somewhat eclipsed by the quantities of work on understanding such phenomena, work on production still reflects an impressive breadth of interest in the general research community. Consequently, outside of the wide range of topics covered in this volume, there exists work on other topics which deserves mention. This section aims to sample some research in these additional areas.

#### 3.1 Other areas of psychology

In various specialised areas of psychology, investigation of metaphor use has become established, including in research on:

- Autism Spectrum Disorder (e.g. Kasirer and Marshal 2014, 2016, 2018).
- Williams Syndrome (e.g. Naylor and Van Herwegen 2012).
- Depression (e.g. Bartczak and Bokus 2017, McMullen & Conway 2002)
- Children’s language production development (see, e.g., Colston 2015: 95, 189)

In terms of broader psychological phenomena, there has long been awareness of the deep connection between metaphor and emotion, and metaphor production has been a focus of research in this area (e.g. Fainsilber & Ortony 1987, Gibbs et al. 2002, Lubart & Getz 1997). In particular, Fainsilber and Ortony (1987) carried out a comprehensive examination of the use of metaphor to express emotions such as anger, anxiety and the like, finding among other things that more intensity of emotion resulted in increased metaphor use.

A range of cognitive psychological factors are at play during the production of metaphor, with these factors affecting not only the amount but also the quality of metaphors produced. For example, Chiappe and Chiappe (2007) carried out experimental investigation into working memory as one such factor, e.g. finding that increased access to working memory leads to increased aptness of metaphors,

and relatedly, reducing working memory access leads to reduction in quality of metaphor. In a follow up study, Pierce and Chiappe (2008) present results supporting the so-called class-inclusion account of metaphor (i.e. preference for vehicles which exemplify the category one wants to attribute to the topic), demonstrating, among other things, that metaphors are a useful tool for examining psychological phenomena.

Finally, an interesting investigation of metaphorical use, and cognition more generally, has been carried out by Beaty and Silvia (2013), focusing on the interaction between metaphor production and various facets of human intelligence. For the purposes of this study, they distinguished between creative and conventional metaphor, as well as between so-called “fluid intelligence” (largely involving rule-based reasoning, divergent thinking, and the like) vs. “crystallized intelligence” (largely to do with acquired knowledge) vs. “broad retrieval ability”; the investigation examined how these aspects of intelligence influence production of the two distinct metaphor types. They found evidence that the executive processing associated with fluid intelligence predicted production of creative metaphors, while production of more conventional metaphors was predicted by acquired knowledge, i.e. so-called “crystallized” intelligence.

### 3.2 Psychotherapy

Closely related to the more research-oriented perspectives of work in psychology described in the section immediately above, metaphor production has also been prevalent in the more clinically and/or therapeutically oriented area of psychotherapy. Tay (2014) provides a comprehensive overview of this area, and includes discussion of the use of metaphor by clients to symbolise emotional states, as well as supporting the development of empathy and what is termed “therapeutic alliance”, i.e. when a client better aligns with a counsellor within a therapeutic setting. (See also McMullen (1996) for an earlier, close review.) Tay (2013: 3), describing psychotherapy as “involving naturalistic verbal communication between therapists and patients”, provides a comprehensive account of the “clinical use and management of metaphors”. Tay follows a discourse analysis methodology, which has been a somewhat popular approach in this area. This methodology has been shown to be adaptable to a variety of investigative aims (see, e.g., Roberts & Kreuz 1994), enabling relatively powerful insights about often complex phenomena.

McCurry and Hayes (1992) address the distinction between more research-oriented vs. more clinically oriented approaches, examining the overlap between these areas in the areas of memorability, comprehensibility and aptness. We will come back to some of these areas below when examining metaphor use for neurophysiology. Starting from a notion of verbal expression of so-called “therapeutic”

metaphors by children, where such metaphors are those occurring in a therapy context, Chesley et al. (2008) extended this notion to include use of “non-verbal” therapeutic metaphor by children interacting during play therapy. They present the example of a child who has experienced domestic abuse imagining a “super durable metallic tank” which would be impervious to all kinds of extraordinary attack (e.g. from dinosaurs), as illustrating the role of non-verbal metaphor production during such therapy. A particularly interesting aspect of this work involves therapists trying to help their client change their metaphors about themselves and their lives, presented as being somehow therapeutically beneficial for the person to do this. An interesting report of such work is presented in Needham-Didsbury (2012). In addition, Angus and Korman (2002) present a detailed study of how the change in metaphors used by clients during therapy sessions can be used to gain greater understanding into the therapeutic process. See Colston (2015: 143) for some additional references and commentary on the production of metaphor in therapy. See also the chapters by Nacey and by Turner et al. in the present volume for work related to therapy.

In the context of healthcare, Demjén and Semino (2016) present a very comprehensive consideration of metaphor production for patients with physical illness. Use of metaphor here equips such patients with what is termed the “framing power” of metaphor in order to deal with unpleasant and potentially distressing experiences. Conversely, they also contend that metaphor may also contribute to less positive aspects of illness experience, including anxiety and shame. In the current volume, the papers by Nacey and by Turner et al. have similar points to make about the importance of the role of metaphor in patient experience of their illnesses. Havsteen-Franklin (2016) presents an example of where metaphor production facilitates art therapy for patients with severe depression.

Finally, while metaphor production in schizophrenia-spectrum disorder has been seldom investigated, a major study by Elvevåg et al. (2011), perhaps surprisingly, found schizophrenic patients use a similar amount of figurative language as control subjects. Relatedly, on the metaphor comprehension side, they found no difference in terms of idiosyncratic interpretations of figurative language. Their conclusion was then that schizophrenia apparently does not affect this area of cognition.

### 3.3 Neurophysiology

Neurophysiological research on figurative language has historically focused on comprehension rather than production, given the complication that production typically requires increased bodily activity, which will of course be reflected in elevated brain activity – solving such challenges requires development of a meth-

odology able to handle such additional complexity. But work has also been carried out which examines the neural correlates of figurative language production.

In a novel production study that employed functional Magnetic Resonance Imaging (fMRI) to investigate neural correlates of subjects completing sentences or phrases by generating novel metaphors, Benedek et al. (2014) examined specific correlates of novel metaphor production, consistent with previous work on metaphor processing more generally. Specifically, they found that generating novel metaphor apparently relates to a region of the brain “relevant for nonliteral language processing in general – both comprehension and production – by activating and relating shared semantic information between remotely associated concepts”. In addition, they found evidence, in terms of production, supporting the work of other researchers that the brain’s right hemisphere plays an important role in “the processing of novel metaphors and non-salient meaning on language”.

Beaty et al. (2017) extended this line of research to investigate the networks in the brain involved in creative metaphor production. Following a similar methodology to Benedek et al. (2014), and extending this with methods focusing on functional and temporal connectivity, Beaty et al. hypothesised that “metaphor production would be associated with activation of a network of brain regions involved in semantic integration, executive control, and spontaneously-generated thought”. They situate their work within so-called “creativity neuroscience”, which involves investigations of interactions across networks within the brain, in particular the dynamics of such interactions, apparently reflected during cognitive processes such as planning, regulation of emotion, memory suppression and the like. Beaty et al. suggest their results point to networks of brain regions involved in metaphor production, with evidence for “functional connectivity” between these regions, as well as “temporal connectivity” showing “differential coupling at different stages of metaphor production, including dynamic connectivity between default, salience, and executive network regions”. They conclude that their results overall support “the notion that creative cognition involves cooperation between brain regions associated with executive control and spontaneous thought”.

### 3.4 Metaphor usage across languages

In the face of ever declining levels of minority languages across the world, consideration of metaphor across minority languages is becoming more and more urgent. Exemplary of work in this area is the collected volume by Idström and Piirainen (2012), entitled *Endangered Metaphors*. This title reflects a key feature of their project: when metaphors disappear so do the conceptualisations of the world

they encode, which reflect potentially unique understandings and perspectives. This adds a certain urgency to such work, which aims to capture such information in the face of world-wide language endangerment.

Metaphor has also been widely reported in signed languages; for comprehensive overviews, see Wilcox (2000) and Taub (2001). Taub's "double-mapping" account of metaphor in American Sign Language (ASL) is especially compelling; from a suggestion that iconic signs emerge from mapping physical aspects of the sign to components of its meaning, Taub extends this to metaphor, by complementing the iconic mapping with a metaphorical mapping from source meaning to a target domain. Liddell (2003) notes the use of signs with a more concrete meaning of directing or moving to express more abstract meanings about mental processing (e.g. using the sign IDEAS-ZOOM-BY-HEAD to mean something too difficult to comprehend, using PUT modified with reference to the head to mean putting something to the back of one's mind).

A recent overview of metaphor in sign languages is presented in Meir and Cohen (2018), who in addition argue for the distinctiveness of signed compared to spoken languages, pointing out that, first, some spoken language metaphorical expressions do not retain their metaphorical meaning when translated into signed language, and second, while spoken language expressions may have the same form for both their metaphorical and non-metaphorical meanings, metaphorical expression in signed languages often involves some (slight) modification of the form of the sign. Meir and Cohen extend Taub's proposal to develop the "double-mapping constraint": "A metaphorical mapping of an iconic form should preserve the structural correspondences of the iconic mapping. Double-mapping should be structure-preserving." They invoke this constraint to account for relatively straightforward spoken language metaphors apparently not being available in signed languages; for example, they contend that the metaphorical English expression "*time flies*" and its lexical counterparts across multiple spoken languages, are not possible in sign languages, since the concept being semantically enriched is represented by an iconic sign, "whose form highlights aspects of the meaning that should be bleached in the metaphor" – in the case of FLY, the emphasis on a hand movement representing flapping, whereas "[t]he metaphor profiles speed of motion."

### 3.5 Metaphor and translation

Research into metaphor and translation has pursued avenues of investigation in both directions of interaction between them. On the one hand, seminal work by Raymon van den Broeck (1981) examines how metaphor reveals constraints inherent in translation, along dimensions such as:

- “translatability”: a measure of closeness of languages, in terms of contact or culture (high for languages that are closer), or of relative complexity of information (high where information is less complex, i.e. involves fewer “types” of information).
- “translational norms”: where a translator chooses to adhere to norms of the source language SL (exhibiting a tendency to translate metaphors in the stricter sense), or else adhere to norms of the target language TL (exhibiting a tendency to replace SL metaphors with those found in the TL).

An important background to this kind of work originates within Descriptive Translation Studies, see for example, Schäffner (1998) and Toury (2012), where translation is seen in terms of the behaviour of the translator, as with any act of communication, being guided by so-called “norms” (regularities of behaviour, essentially socio-cultural in origin), similar to the kinds of conventions typical of all manner of communication acts.

Other work considers how translation gives rise to insights into the workings of metaphor. Schäffner (2004) usefully contrasts approaches to translation within linguistics proper, distinguishing source vs. target language, and approaches within text-linguistics, distinguishing source vs. target text. This contrast enables making a subtle yet important point that there is no guarantee that source text (ST) images will be retained in target texts (TTs), since translation does not require such a structure within the TL, or that even if associations from the SL somehow triggered associations in the TL, this does not require mapping SL associations to TL associations, and neither does the subsequent emergence of metaphor in the TL. Translation does not require SL webs of associations being reproduced within the TL: it is not the word-to-word or even concept-to-concept associations, but rather the making of word-to-world connections within the TL that drives successful translation. Schäffner concludes that “translations can make differences in conceptual metaphors, and/or metaphorical expressions explicit”, and further that “analysis of texts with respect to metaphors and metaphorical reasoning processes in different languages can, thus, reveal possible cultural differences in conceptual structures.” Such challenges identified within the field of translation studies have been taken over into other disciplines, such as Machine Translation (e.g. Shutova et al. 2017).

Roush (2018) presents an interesting connection between the themes of this section and the one immediately above, by examining how differing communication modes shape the conceptual level of communication, including metaphor; the specific modes focused on here are signed vs. spoken modes. Focusing on the differing material bodily experiences of users of signed vs. non-signed language, Roush proposes that when translating metaphors from spoken English source text (ST), culturally Deaf translators make choices regarding metaphors within

the ASL target texts (TT) based on the norms of their linguistic community, with many Deaf translators demonstrating “a tacit ability to shape their translations in ways that are more acceptable to Deaf audiences than the translations rendered by hearing translators”. Within Descriptive Translation Theory, techniques are available that are useful to “reconstruct and explicate the norms by which translators tacitly operate”, although Roush notes that little is understood about such norms for the Deaf community. Based on such starting points, Roush proposes the following directions for investigation:

Through the use of corpus-based evidence, several specific questions are addressed: are the main branches of Event Structure Metaphors [ESMs] – the Location and Object branches – exhibited in ASL? Are these two branches adequate to explain the event-related linguistic metaphors identified in the translation corpus? To what extent do translators maintain, shift, add, and omit expressions of these metaphors?

Roush presents a range of interesting corpus-based results, in terms of the overlap for ESMs between English STs and ASL TTs. In particular, one striking result relates to a distinct form of ESMs, Container ESMs, whereby some domain is conceived of in terms of events deriving from containers (e.g. joy described as released from within the body, the latter being viewed as a kind of container): it turns out that Container ESMs occur significantly more frequently in ASL TTs than spoken English STs. Roush presents various explanations for this discrepancy, citing differences in “iconicity, linguistic variation and culturally situated embodiment” as possible sources.

### 3.6 Across modalities

The study of metaphor in other modalities such as music, visual art and dance is well established. Zbikowski (2008) surveys this area quite comprehensively, in particular, spending a large proportion of this survey considering mappings between language and music, especially evident in the use of linguistic metaphor for analysing music, such mappings stemming from a common core of image-schematic structures enabling the expression of meanings in both modalities. Kennedy (2008) examines metaphor in pictures (cf. his chapter in the present volume), focusing on how it can be employed to draw attention to a specific theme, and providing a particularly interesting discussion of the distinction between metaphors in pictorial art vs. that in language, considering more or less successful examples in each. Forceville (2008) discusses multimodal expression of metaphor in other art-forms such as film, as well as other multimodal settings such as advertising. An interesting aspect of Forceville’s account is how metaphor can be used to enhance coherence of a film or other form of expression, which is a crucial aspect of its role in production of all kinds. See Hidalgo-Downing and Kraljevic Mujic (2020) for a recent collection of articles crossing various modalities and considering in particular the interaction of different modalities.

### 3.7 Other

As well as the areas mentioned above, there are a range of other areas in which the role of figurative language production has been discussed, albeit less extensively. However, before exemplifying these other areas of interest, it should be pointed out that, while there is strong evidence of the importance of figurative language across a broad range of human endeavour, it is also useful to determine the limitations of the role of this kind of language; for example, while humour would seem to be a natural home for metaphor, in a recent study on humour and creativity, Kellner and Benedek (2017) conclude with the interesting aside that “metaphor production and humour production rely on different patterns of cognitive abilities.”

An interesting study on figurative language production in the context of religious activities is presented in Corts and Meyers (2002). The authors report on a study into the production of what they term figurative language “clusters” or bursts of figurative language. By way of providing possible explanation for this “burstiness” of such language, it is suggested that such clusters have typical features, including conceptual coherence, novelty and topicality, any of these features providing a possible motivation for their usefulness in the context of such organised events as sermons to a congregation.

Birdsell (2018) presents a very comprehensive study of metaphor production in the context of language acquisition. His main findings were that, despite variation across languages (comparing Japanese and English), differences in metaphor production turns out to be largely due to individual differences, which it is suggested could be related to various measures of creativity.

Finally, figurative language, particularly the more novel forms, often enables drawing links between conceptual domains not ordinarily related; it is therefore interesting to discover work on metaphor use for more creative pursuits crossing over into sometimes surprising areas. One example of this is the work presented in Glicksohn et al. (2001), which in part uses a tool for testing metaphor production (the *Barron Symbolic Equivalence Test*), in order to compare cognition in creative artists to that in schizophrenic patients; they find some mild support in their results for greater levels of so-called “syncretic” cognition and other related behaviour in both these groups for the majority of test tasks.

## 4. Final remarks: Demarcation of production and understanding

Research over several decades has shed light on the tight coupling of production and understanding, particularly during linguistic interaction. A large part of this research has stemmed from work on how people coordinate their relative contributions during complex interactional activity, from moving furniture, dancing or



engaging in dialogue, all the way up large-scale social activities such as meetings involving hundreds or even thousands of people. Such work has led to the realisation that much of our everyday actions are *joint* actions (e.g. Sebanz et al. 2006, Vesper et al. 2017), the success of which depends on agents coordinating their contributions in order to achieve goals that are in large part social. As Sebanz et al. (2006) point out, joint action requires various capacities, including joint attention, close observation of actions, sharing of (components of) tasks, action coordination and agency; in particular, a key requirement for our purposes is for participants to be aware at some level of the contribution of others, enabling them to choose appropriate responses, so that their behaviour can then be considered more or less “intentional”.

Sebanz et al. (2006) further point out that the tight coupling of production and understanding is an important feature of the coordination arising from forms of joint action such as occur during linguistic communication (not denying of course the importance of all kinds of non-linguistic information used during such coordination). Achieving successful coordination during linguistic communication crucially relies on exchange of detailed information, about what needs to be accomplished, by whom, where and when, the surrounding environment, etc. – an important question in such research is to determine exactly what kind of information is useful for achieving coordination. Furthermore, researchers have identified various mechanisms available to facilitate such coordination, from the capacity for individuals to recognise and produce signals when coordinating with one another, all the way up to the large-scale social and cultural mechanisms, such as conventions, norms and practices enabling a variety of complex actions often involving large groups of people. The literature on joint action in linguistic interaction is extensive, and involves ongoing debate over relatively foundational issues; for details on such this area; for some appreciation of the key issues, see Garrod and Pickering (2009), Brennan and Hanna (2009), Brown-Schmidt and Hanna (2011) and Kronmüller et al (2017).

A related research direction which has become somewhat established over the decade or more, although with perhaps unclear results, is the interplay between so-called “embodied cognition” (e.g. Gibbs et al. 2004, Hellman et al 2013) and processing figurative forms of expression (linguistic and otherwise). A recent example is work by Al-Azary (2018) on the role of sensorimotor processing in metaphor production in figurative suggesting speakers prefer to produce metaphors that have the so-called “body-interaction” dimension of meaning, thereby making such metaphors apparently easier to interact with.

For this reason and a variety of others, production processes may potentially be inextricably entwined with understanding processes, making it impossible to get a full analysis of either in isolation. This is worth remarking, because it could

be increasingly important in future work on the understanding and production of language, particularly in the figurative case.

One particular type of potential intertwining is as follows. Any theory of communication/expression that has the producer (e.g. speaker) thinking about what the consumer (e.g. hearer) might understand from the item produced, and/or, dually, has the consumer thinking about what the producer means (rather than the consumer just extracting a meaning, without considering the producer's intentions) is potentially a theory where the producer is thinking about the consumer's understanding processes and/or the consumer is thinking about the producer's production processes. Now, of course, such thinking is likely to be based on inaccurate theory or simulation of the processes, one based merely on common sense and own cognitive make-up and life experience. Nevertheless, for linguistic discourse and other expressive interchanges to work reasonably well much of the time, presumably the accuracy of the thinking by producer and consumer about each other has to be beyond some threshold. Thus, the study of production ends up involving consideration and/or illumination of actual consumption processes, to some appreciable extent, and conversely the study of consumption ends up addressing production processes, to some appreciable extent. This is not to say that producers and consumers do actually always consider each other's viewpoints, processes, etc. Colston (2015: 101–133), in an extensive discussion of consumer and producer potentially considering their common ground, links the issue to the experimentally demonstrated, frequent egocentricity of language users.

Moreover, we have proposed (Barnden et al. 2004; Barnden 2020) that the understanding of partly metaphorical discourse may, paradoxically, profit from involving a form of metaphorization. Roughly speaking, metaphorization is the mental translation of some literal segments of the discourse into prevailing metaphorical terms. This is the reverse of the normal idea that an understander must, in effect, mentally convert the metaphorical segments into literal mental representations about the target subject matter. The claim is that, in interpreting partly metaphorical discourse, it can at least sometimes be useful to engage in a mix of metaphorizations and normal, metaphorical-to-literal conversions. Consider, for example, the following: *“The idea that her husband had betrayed her was buried in the dark recesses of Anne’s mind. It took her months to acknowledge it.”*<sup>7</sup> The claim is

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7. This example is slightly edited from an example found in a popular-magazine article on denial to oneself of uncomfortable truths. See Barnden et al. (2004) for the original example and reference.

that it can be easier for the hearer to get coherent, rich understanding of these two sentences together by converting the second one in his mind into the prevailing metaphorical terms: that is, in terms of viewing the idea as a physical object and viewing Anne's mind as a geographical terrain. The acknowledging of the idea is translated into locating it in the terrain and digging it up. It is easy to understand how such finding and digging-up might take months in reality, so in that sense the metaphorized second sentence is supported by the physical-terrain meaning of the first sentence. Once an overall physical-terrain-based understanding of both sentences together is achieved, conversion of information into terms directly about the mind can be done. By contrast, suppose one just does metaphorical-to-literal conversion of the first statement into a mental representation amounting to something like *The idea's role in Anne's mind was such that it would be very difficult and time-consuming for her to use it*. Then the second sentence is just an arbitrary extra comment with no strong connection to the first sentence – the second sentence is obviously compatible with that interpretation of the first sentence, but is not strongly or specifically supported by it. Thus, if the metaphorization proposal has any merit, then production of metaphor, albeit of an entirely hearer-internal sort, can be part and parcel of metaphorical discourse understanding.

Barnden's AI system for doing the reasoning needed in the understanding of a broad class of metaphors, namely the ATT-Meta system (Barnden 2015, 2016), contains the "reverse transfer" capability needed to support metaphorization. In fact, reverse transfer, i.e. conversion of information in target terms into source terms, is routinely done in ATT-Meta alongside forward mapping, in an effort to keep the source and target scenarios cooperatively developed during understanding in line with each other, in any case of metaphor understanding. It is thus available in particular for the type of metaphorization discussed. But it incidentally also makes ATT-Meta suitable as a basis for a future AI system for metaphor production in the normal, external-expression sense. Work on developing a capacity for automatically generating metaphor in natural language for the ATT-Meta system is reported in Gargett et al. (2013, 2015).

If production of metaphor can occur during hearers' understanding, so conversely the understanding of metaphor can be expected to occur during production. It is reasonable to conjecture that, when a speaker produces a metaphorical item, she herself, at least sometimes (when there's time, she's being careful about what she says, etc.) commits an act of understanding on it, to monitor whether what she herself has produced fits her intentions.

But there is an important caveat here, with huge implications for future work on both production and understanding. It derives from the prevalent idea in Cognitive Linguistics that metaphor lies fundamentally in thought and that much thought is in some way based on metaphor. (For some relevant discussion, see

Hampe 2017, Murphy 1996, 1997, Steen 2017, and Vervaeke & Kennedy 2004.) A radical version of this idea is that our internal mental representations of some types of situation may sometimes only be metaphorical ones: we may have no way of thinking about some situations, even unconsciously, other than through metaphor. (See Barnden 2020 for a particular development of this idea.) For instance, perhaps our common-sense understanding of minds is only metaphorical, at least when it comes to thoughts about the mind that are of any significant complexity and subtlety, beyond simple propositions that so-and-so believes such-and-such, for instance. Then, for such a subject matter T, production of a metaphorical sentence about it might involve just externalizing an existing, already metaphorical thought. Or, it might involve the conversion of a thought couched in terms of one metaphorical view about T into a sentence couched in terms of a different metaphorical view. Such conversion between different metaphorical views might be for the purpose of fitting in with the metaphorical views already used in the ongoing discourse. In short, production of figurative items may go beyond the question of how to produce them on the basis of non-metaphorical thoughts, and may sometimes involve either straightforward externalization of an already metaphorical thought or a sort of translation between different metaphors without benefit of intermediate non-metaphorical meaning.

Finally, there is a related intertwining of production and understanding, represented in this volume by MacArthur's and Musolff's chapters. Many of the produced metaphors that those chapters study are derived from those the producer has consumed. This type of successive renegotiation or development of the form and meaning of metaphors (also evident in work such as that of Cameron 2010) is an important part of the full story of metaphor understanding and production. It has a parallel in the world of irony, where, as Gibbs (2000) and others have pointed out, parties in a discourse can collaboratively extend an ironic view of a situation, often to humorous effect.

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