Tentative title: *Dialogic interaction and resonance: The pragmatics and the grammar of creativity*

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General objectives: This book offers a linguistic account of recombinant creativity (RC) as a mechanism by which speakers proactively re-use and re-adapt the utterances and the actions of their interlocutors. The book argues that this creative process of 'complex imitation' is central in human behaviour and is key for interactional engagement, conceptual categorisation, innovation and intercultural adaptation. With a specific focus on phenomena of RC, the book provides a novel model of analysis of dialogue for the theoretical and applied study of pragmatic competence and grammatical knowledge in language acquisition, language change, across the autistic spectrum, in cross-cultural communication and artificial intelligence.

Target audience: Researchers in the field of pragmatics, syntax, semantics, inter-cultural communication, first and second language acquisition and other branches of applied linguistics, cognitive psychology and natural language processing, advanced students in those fields, educated non-specialist readers. In addition, the book could serve as the foundation for graduate or advanced undergraduate courses in those areas.

Specific objective: This book discusses the functional and conceptual characteristics of recombinant creativity (RC) and puts them into play for multifactorial corpus-based analysis of dialogic interaction. RC is a conceptual mechanism that involves any form of cooperative behaviour among social actors. It hinges on the socio-cognitive capacity to recombine a priming stimulus in order to express a new meaning or perform a new action. It involves speakers' proactive re-calibration of preceding utterances and illocutionary forces, but also – more generally – the creative intervention on patterns of behaviour in context. RC is crucial for four pragmatic and cognitive mechanisms: i. relevance acknowledgement, ii. schematic categorisation, iii. behavioural/linguistic innovation and iv. inhibition of entrenchment.

i. A persistent tendency towards the use and recombination of an interlocutor's utterances is a textual indicator of relevance acknowledgement (Tantucci, Wang & Culpeper 2022). This is because what is said by the other speaker is overtly put on record and treated as useful information for the continuation of the interaction. The opposite trend, on a large scale, is one important indicator of lack of textual engagement (Tantucci & Wang 2021; 2022a, 2022b, 2022c; Tantucci et al. 2022).

ii. RC is also key for speakers' ability to jointly establish constructional and socio-pragmatic schemas as a process of shared categorisation. When RC is at work in dialogue, it underpins dynamic resonance (cf. Du Bois 2014; Tantucci & Wang 2022a 2022b) i.e. the modification of the previous utterance of an interlocutor. For example, this often occurs to boost or alter the illocutionary force of a preceding utterance (Tantucci et al. 2018; Tantucci & Wang 2022a). In the exchange below, B resonates with A's talk while s/he transforms the illocutionary force of the construct [*I'll see you later*] from a greeting to an assertion:

(1)

A: Alright Martin **I'll see you later**
B: **I'll see you later anyway**. I'll.
A: Okay yeah.

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(Tantucci et al. 2018: 10)

In (1) A uses a conventionalised construction to perform a greeting at parting in British English [*I'll see you later*] which is similar to saying *good bye*. This expression is low in compositionality (Traugott & Trousdale 2013), as the semantic contribution of each word to the procedural meaning of the construction is rather opaque. This means that A performs the action of 'greeting at parting' rather than making a factual assertion about *meeting B at some point during the day*. In the following turn, B resonates with A's proposition *I'll see you later*, with the addition of the sentence-peripheral pragmatic marker *anyway*. In this case, B creatively recombines the meaning of the internal constituents of A's utterance as s/he makes a new assertion (which includes a commissive component) to emphasise that *they will effectively meet each other later on*. This is exemplified in Table 1, where creative alteration of the original construction is marked as underlined text (in case of replacement) and in brackets (in case of (addition)):

	1st PERS PRON	AUX	VP	ADV	Illocutionary force
A:	*I*	*'ll*	*see you*	*later*	greeting
B:	*I*	*'ll*	*see you*	*later (anyway)*	commissive

Table 1.
Joint realisation of the commissive construction [*I'll see you later* ADV]

What is key here is that when creative alteration of an original construct is at work, engagement with the other speaker is textually 'on record'. At the same time, new affordances are possible for shared categorisation of pairings of form and meaning. What emerges after B's utterance is the joint understanding that the construct [*I'll see you later* ADV] is structurally similar to [*I'll see you later*], but pragmatically involves a completely different kind of behaviour: from A's *greeting* to B's *commitment to meet again the same day*.

iii. RC is an important component of linguistic innovation for language change (Tantucci & Di Cristofaro 2020; Tantucci et al. 2018) and the design of cognitive architectures in artificial intelligence (Tantucci & Wang 2022a), as it allows speakers to create novel constructions through the re-elaboration of ones that are already part of the repertoire.

iv. Diachronically, RC can also significantly inhibit the repetitive use of conventionalised constructions and behaviours (Tantucci et al. 2018; Tantucci & Di Cristofaro 2020), acting 'against' entrenchment and predictable interaction.

The book provides a number of multifactorial analyses of RC for interactional engagement, joint categorisation, innovation and intersubjectivity (Verhagen 2005; Traugott 2012; Tantucci 2021). These results are based on a novel and replicable corpus-based method of analysis called the Dialogic Categorisation Model (DCM). The DCM allows the analyst to measure empirically the extent and the quality of recombinant creativity in context and provides large scale results about interactional engagement and joint categorisation. The DCM is productive for both theoretical and

[1] British National Corpus, http://bncweb.lancs.ac.uk.Last accessed 26/05/22.

applied purposes. It sheds new quantitative light on human cooperative behaviour in context and the degree to which categorisation of form and meaning emerges as a joint activity among speakers. It finally provides the tools to assess overt engagement and dialogic creativity in diverse populations of speakers[2], which may inform research in usage-based and functional linguistics, cognitive, clinical, and pedagogical psychology, inter-cultural communication and artificial intelligence.

Contents:

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About the author: Vittorio Tantucci is Senior Lecturer of Linguistics at Lancaster University, UK. His publications focus on usage-based intersections of pragmatics and cognition. His main areas of interest are intersubjectivity, speech act theory, reciprocity, language change, first language acquisition and ASD speech. In the last few years a part of his research has been devoted to the corpus-based study of the grammar and pragmatics of dialogic interaction. His recent major publications since 2021 include *Language and Social Minds: The Semantics and Pragmatics of Intersubjectivity* (CUP 2021); "Resonance and engagement through (dis-)agreement: Evidence of persistent constructional priming from Mandarin naturalistic interaction" (*Journal of Pragmatics* 2021, authored with Aiqing Wang); (The principle of (im)politeness reciprocity, *Journal of Pragmatics*, authored with Jonathan Culpeper); "Reciprocity and epistemicity: On the (proto) social and cross-cultural 'value' of information transmission" (2022, authored with Aiqing Wang and Jonathan Culpeper); "Resonance as an Applied Predictor of Cross-Cultural Interaction: Constructional Priming in Mandarin and American English Interaction" (*Applied Linguistics* 2022; authored with Aiqing Wang), "Dialogic Priming and Dynamic Resonance in Autism: Creativity Competing with Engagement in Chinese Children with ASD" (*Journal of Autism and Developmental Disorders* 2022, authored with Aiqing Wang), "Dynamic resonance and explicit dialogic engagement in Mandarin first language acquisition" (*Discourse Processes* 2022, authored with Aiqing Wang).

[2] 'Population' here is used as a statistical terminology, it may refer to individuals' ethnicity, age, language, cultural background, neurotypicality and so on.

Chapter 1
Recombinant creativity and dialogic resonance: An introduction

Chapter 1 establishes the core theoretical premises of this book. It introduces the notion of recombinant creativity and illustrates its importance in human interaction for engagement and shared categorisation.

I define recombinant creativity (RC) as a conceptual mechanism involving the socio-cognitive capacity to re-use a priming stimulus – may it be linguistic or behavioural – to express a new meaning or perform a new action. RC can be at play in any sort of responsive behaviour. In dialogue, it unfolds in the form of dynamic resonance (cf. Du Bois 2014; Tantucci & Wang 2021; 2022a, 2022b, 2022c; Tantucci et al. 2022), that is the creative re-adaptation of the utterance of an interlocutor. The mechanism of RC is fourfold: firstly, it serves intersubjective coordination and alignment (Goodwin & Heritage 1990), as speakers re-use linguistic material that has just been produced by their peers. Such creative re-elaboration of what was heard is important for Pragmatics' research in that it overtly expresses the acknowledgement of relevance of the other persona's speech (cf. Grice 1975; Sperber & Wilson 1986, 2002; Tantucci et al. 2022) for the continuation of the on-going interaction. At the same time, recombinant capacities are fundamental for cognitive and socio-normative categorisation. This applies to different levels of schematic abstraction of linguistic constructions (Brône & Zima 2014), but also to social schemata (i.a. Steffensen et al. 1979; Eysenck & Keane 2010) and adaptive behaviour in specific socio-cultural contexts. RC is also central for linguistic innovation in language change and for the design of a creative component in Natural Language Processing and Artificial Intelligence (Tantucci & Di Cristofaro 2020; Tantucci & Wang 2022a). This is because it allows speakers to establish novel constructions from the re-elaboration of ones that are already part of the repertoire, which is arguably a key trigger of human linguistic evolution as a 'counterforce to singularity' (Christiansen & Chater 2022). Finally, RC is an important mechanism for the inhibition of conventionalised and repetitive behaviour (this last point is discussed in Chapter 6).

RC is a key notion for the enacted view of human cognition as being inherently geared towards cooperation (Tomasello 2019; Tantucci 2021) as a joint activity (Clark 1996; Pickering & Garrod 2021). It is based on the perspective that interaction is primarily 're-active' in that meaning emerges as a creative re-elaboration of what was said by others (cf. Hopper 1987, 2011). The case-studies in the present monograph will prevalently focus on where RC occurs as a recombination of previous utterances through dialogue and provide an applied model of analysis to measure interactional creativity and engagement, i.e. what in chapter 2 will be referred to as dialogic categorisation analysis (DCA). However, RC involves any form of interactional behaviour and is potentially a key notion in research centred on multimodal interaction, e.g. in the analysis of facial expressions (e.g. Busso et al. 2004; Kessous et al. 2010), gestures (e.g. Mapson 2014; Brown & Winter 2019), but also online communication via emoticons and emoji.

The core element of the usage-based approach in Cognitive Linguistics has been the study of constructions as holistic pairings of form and meaning (i.a. Langacker 1987; Goldberg 1995, 2006; Kay & Fillmore 1999; Tomasello 2003; Traugott & Trousdale 2013). The more a speaker is exposed to real use of forms with similar semantic and/or morphosyntactic features, the better his/her

capacity to categorise meaning and produce new forms that bear some structural similarities to the ones s/he experienced.

Despite a clear focus of traditional usage-based models on naturalistic interaction, constructions have been traditionally addressed as representations of one single speaker. However, in recent years new emphasis has been given to the enactment of constructions through dialogue and the way they are conceptualised and produced by two – or more – interlocutors. This led to the rise of new models of dyadic cognising (Hopper 1987, 2011; Arundale 2008; Arundale & Good 2002; Haugh & Bargiela-Chiappini 2010; Tantucci & Wang 2022a, 2022b, 2022c) in which structure and meaning of utterances are repeatedly recalibrated and re-conceptualised by both speakers throughout turns at talk (Dingemanse 2020: 24). As part of this new strand of research, dialogic constructions have become a key component of usage-based approaches to Dialogic Syntax (cf. Du Bois 2014; Zima & Brône 2015; Tantucci et al. 2018). This is where constructions emerge dynamically during the here-and-now of interlocutors' interaction (Du Bois & Giora 2014) and often involve the creative re-elaboration of forms and meanings that have been used throughout a dialogue (cf. Tantucci & Wang 2022a, 2022b).

What this entails is that perhaps too much emphasis has been placed on linguistic processing as an idiosyncratic mechanism, i.e. one that is primarily geared towards the formation of entrenched 'chunks of language', which is often represented as a large inventory of 'fixed constructions' (Hopper 2011: 27), as linguistic properties of utterances chosen for a particular communication partner are not simple conventionalized reflexes to situational variables, but rather a set of solutions to particular problems that are employed strategically (Fischer 2016: 285). Not enough attention has yet been given to the inherently recombinant nature of spoken language, in a way that speakers need to constantly and quickly adjust structure and meaning to new dialogic stimuli. A fundamental underpin of this is that form and/or the function of interactants' utterances are re-adapted and re-calibrated, with affordances for new linguistic categorisation that normally emerge during the here-and-now of the dialogic exchange. Resonance involves RC as it allows speakers to construe analogies (i.a. Fischer 2008; Gentner & Christie 2010) 'on the fly' across turns at talk. The naturalistic exchange below is retrieved from the demographically sampled section of the British National Corpus[3]. The conversation is about the East End of London and the possibility to find bananas in the past in that area:

(2)
A: Nobody had bananas, first bananas came in about forty five.
B: Came a long way **didn't they**?
A: <unclear> one of these ships docked **isn't it**?
A: Cos one of them brought bananas in.

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In (2) speakers eventually align formally and pragmatically with one another via strategies of expected agreement (cf. Tantucci 2017b 2021). This is achieved formally via the tag-question construction [P V*'nt* PRON ?], which in British English is conventionally used to make an assertion along with the expectation of the addressee's agreement with his/her statement. B is the first to use the construction in the specific form of [*Came a long way didn't they*?]. A then creatively resonates with B's strategy via the utterance [*one of these ships docked isn't it*?]. Instances such as (2) are

[3] http://bncweb.lancs.ac.uk. Last accessed 22/06/2022.

very common in dialogue as engagement is often textually reflected in the form of resonating constructions.

A transition from mere repetition to creative recombination is normally observed in child's ontogeny (Koymen & Kyratzis 2014; Tantucci & Wang 2022b, 2022c). In early stages of first language acquisition (FLA) children frequently repeat the priming input of their carers or peers. When this happens, resonance occurs 'statically', i.e. only on the form of a mere repetition, as recombinant creativity (RC) is not at play for the cooperative elaboration of new meanings:

(3)
MOT: 火山爆发啊。
huǒshān bàofā a
volcano erupts SFP
'The volcano is erupting!'
CHI: 火山爆发。
huǒshān bàofā
volcano erupts
''The volcano is erupting'.'
CHILDES[4] / Zhou2 / mb14 / 4;00

In (3) the child (CHI) resonates with what she heard but does not creatively recombine the priming input of the mother (MOT) in order to express something new. This is a case of static resonance, as the construction [火山 *huǒshān* 'volcano' 爆发 *bàofā* 'erupts'] is simply copied.

On the other hand, when structural, semantic, and pragmatic features of a dialogic prime are creatively recombined, resonance is dynamic and thus involves RC (Du Bois 2014: 353; Tantucci et al. 2018). These are cases where a previously encountered utterance is creatively re-elaborated on the fly and novel analogies are realised across turns at talk. A key aspect of RC in FLA is that it often serves explicit interactional goals (Corsaro & Maynard 1996; de León 2007; Ervin-Tripp 1991; Goodwin 1990, 2006; Keenan 1977).

Hurley (2008) refers to the notion of 'true imitation' in phylogeny as a sophisticated form of social cognition, which requires a novel action learned by observing another do it plus instrumental or means-to-ends structure. When behaviour is recombined as a new modality to achieve new goals, complex imitation is at play, which is something that cannot be found in non-human (e.g. chimps) imitation (Call & Tomasello 1994; Nagell et al. 1993; Voelkl & Huber 2000). In FLA, the child shows increasing abilities of complex imitation in the form of RC when s/he resonates dynamically with utterances of his/her peers. Consider the British English interaction below from the Fletcher Corpus:

(4)
INV: I have a board (.) this one and **we have some stickers**.
INV: And you can put the stickers from here on to the board.
INV: Have you seen such a game before?
CHI: Yeah, but **I have (.) got some stickers at home** but not these <sort>.
CHILDES / Fletcher / cpmich / 5; 02

[4] https://childes.talkbank.org. Last accessed 14/06/22.

In the exchange above, the 5-year-old child does not simply repeat what is said by the investigator (INV), but rather enriches a previous construction that she heard in order to engage with INV's talk. More specifically, s/he textually re-elaborates the construct [*we have some stickers*] in the form of [*I have got some stickers at home*]. Pragmatically, CHI does not simply answer INV's question – s/he could have simply said *yes* – but feels the need to reciprocate INV's talk by proactively providing INV with new 'unsolicited' information about *those stickers*.

An operational way to analyse this transition – and any other case of RC – across turns is in the form of a diagraph, i.e. a syntactic structure that emerges from the coupling of two or more utterances (or utterance portions) through the mapping of resonance relations between them (Du Bois & Giora 2014: 354). The corresponding diagraph of example (4) is given in Table 2 below.

	Subj	HAVE	some	stickers
INV	*we*	*have*	*some*	*stickers*
CHI	*I*	*have (got)*	*some*	*stickers (at home)*

Table 2.
Diagraph of [Subj HAVE *some stickers*]

Diagraphs are important for the operational annotation of dynamic resonance. That is because they allow an annotator to capture the degree of schematicity that is jointly construed by the interlocutors.

Creativity here is key, as the recombinant modification of a previous input allows for the identification of a higher node of schematicity in the speakers' constructicon (cf. Fillmore et al. 1998). This principle is relatively simple: analogy across similar constructs tiggers categorisation, as some common features are immediately identified among two single instantiations of form and meaning. In the case of (4), INV's original construct is re-elaborated and expanded by CHI in a way that *we* can be replaced by a similar personal pronoun functioning as the subject *I*. The predicate *have* can be replaced with *have got* and the object *stickers* can be expanded with an external location for the possession of the object. This recombinant process creates affordances for the joint categorisation of the more schematic form [Subj HAVE *some stickers*] as a higher node of abstraction in the constructional network of both speakers. This dialogic perspective thus entails that conceptual categorisation does not unfold with the explicit goal of 'learning' new constructions, but rather as a natural consequence of interactional engagement: proactive re-elaboration of form and meaning triggers categorisation.

An important claim of this book is thus that linguistic categorisation is not just the product of 'one mind' but occurs principally during the here-and-now of dialogic exchanges. One speaker recombines form and meaning of a previous utterance and, as result, rapidly proposes new affordances for creating – or identifying – a more schematic node of abstraction (which may or may not be already present in the interlocutors' repertoire). This occurs 'at talk' through a 'conceptual pact' (Brône & Zima 2014) with the other(s) interlocutor(s) so that the categorisation of new constructions – or the identification of ones that are already known – is 'interactionally plausible'. Such enacted process of conceptualisation is effectively a form of dialogic schematisation.

RC is finally fundamental for interpersonal pragmatics and the categorisation of socio-normative behaviour. People become more or less consciously aware of the type of activity they are jointly engaged in (Tomasello 2008: 72) and jointly construct this activity type (Berger & Luckmann 1966: 89–96; Levinson 1979; Fillmore & Atkins 1992). A child who happens to watch a boxing match on the television may notice that at the end of the last inning the two contestants hug each other as a sign of fair play. The child may engage in complex imitation and adapt that behaviour with one of his/her peers with the expectation that this will further improve their social relationship. S/he may recombine the punching component of the boxing 'game' into a judo class with his/her mates. Pretty soon s/he will learn that punching is bound to very specific situation types in order to be socially acceptable. S/he will eventually also learn that even in the context of a boxing competition, 'punching' is not necessarily conducive to the improvement of interpersonal relationships. The categorisation of normative behaviour in context requires a speaker's ability to engage in complex imitation and recombine some components of situated interaction. This means that the categorisation of 'normatively polite' conduct results from the proactive enactment of behavioural components that will be found to be acceptable by some community of practise in some situation. Politeness itself (in the sense of politic engagement, cf. Watts 2003; Culpeper & Tantucci 2021; Tantucci et al. 2022) results from dialogic categorisation and is construed via an enactive process of recombinant implementation of possible 'behavioural slots' that are experienced to be normatively acceptable in some activity type or minimal context (cf. Terkourafi 2005).

Chapter 2
Recombinant creativity at work: Dialogic categorisation model (DCM)

This chapter illustrates the operational annotation of the dialogic categorisation model (DCM), which will be a core element of all the case-studies presented in the book. The DCM can quantitatively inform the degree of interactional engagement and shared categorisation among interlocutors.

Categorisation in language occurs in the form of increased schematicity (Langacker 1987; Croft & Cruise 2004; Traugott & Trousdale 2013). Schematicity is normally addressed as a usage-based process of abstraction of form and meaning. The construction [*I am tired*] is less schematic than [*I am* ADJ], which is less schematic than [*I* BE ADJ], which in turn is less schematic than [*I* V ADJ], which is less schematic than [Subj V ADJ], which is less schematic than [SUBJ PREDICATE] and so on. The phonetic realisation of *I am tired* may correspond to all of these representations. What is distinctively novel of the present framework is that increasing schematicity is intertwined with recombinant creativity (RC) in dialogic interaction and can be measured and predicted via large scale corpus-based analysis. Namely, the process of schematisation from a specific instantiation of form and meaning ([*I am tired*]) to more schematic constructions ([Subj V ADJ]) does not only pertain to individual cognition, but requires the implementation of a recombinant component that is primarily bound to the here-and-now of an interaction.

Such a stance raises a number of issues hinging on those populations where interactional engagement is somewhat impaired, as for individuals with autistic spectrum disorder (ASD). In this sense, the book will provide evidence to show that in ASD dialogic schematisation is somewhat less flexible (cf. Chapter 5), and might rather occur as a delayed process, e.g. via echolalia (Sterponi & de Kirby 2016) and other behavioural and conceptual mechanisms of memory retrieval that are not immediately at play during the here-and-now of the interaction (cf. Tantucci & Wang 2022a, 2022c).

On the other hand, RC is rather key in neurotypical interaction. The exchange in (5) taking place during a business meeting:

(5)
A: I'm not looking for it to make, make a profit,
B: No.
A: be super efficient, it's just that <pause> there is a chance of keeping going without too
B: Yes.
A: without **having a crisis every other year** or whatever.
B: Yes, this is exactly one of the reasons **we had a crisis last <pause> last time** <pause> was because <pause> erm we didn't know <pause> that the then director I'm sure didn't know what, what was happening.

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In Example (5) the interlocutors jointly realise the emergent structure [HAVE a crisis TIME-ADV] as a result of the recombinant intervention on A's utterance [*having a crisis every other year*] corresponding to B's response [*we had a crisis last time*]. This is illustrated in the diagraph in Table 3:

	HAVE	*a*	*crisis*	TIME_ADV
A	*having*	*a*	*crisis*	*every year*
B	*(We) had*	*a*	*crisis*	*last time*

Table 3.
Diagraph [HAVE a crisis TIME-ADV]

As shown in the diagraph above, dialogic schematisation is at work, as both utterances are specific instantiations of the more schematic construction [HAVE *a crisis* TIME-ADV]. The latter emerges 'on the fly' as a bottom-up process of categorisation driven by analogy and engagement across turns. An operational quantification of this mechanism can inform the large scale analysis of recombinant creativity in interaction as a continuous variable.

The way to assess this operationally is to count the internal constituents of the schematic structure [HAVE *a crisis* TIME-ADV], namely 4. I define this model of annotation as the Dialogic Categorisation Model (DCM), which has the power to inform large scale, multifactorial account of dynamic resonance (Tantucci & Wang 2020b; Tantucci & Wang 2022a, 2022b, 2022c). The advantage of this framework is that it can reliably inform the empirical quantification and prediction of dialogic schematicity, relevance acknowledgement and creative innovation, which are key mechanisms for applied approaches engagement and conceptual categorisation in Pragmatics and Cognitive Linguistics. This method proved to be quite stable for inter-rater reliability (reflected in Cronbach's Alphas) of annotated data in FLA, ASD, cross-cultural Pragmatics and language change, and is particularly suitable for mixed effects multiple linear regression (Tantucci &Wang 2020b; Tantucci & Wang 2021, 2022a, 2022b, 2022c). Two conditions for the implementation of the analysis need to be met:

a. For the identification of resonance, there must be at least one lexical unit being repeated from interlocutor A to B.
b. The measurement of dynamic resonance includes the units that allow the identification of the node that is immediately higher up in a constructional network.

The reason for condition *a* is that schematic structure is always present in conversation, which could be challenging for the delimitation of cases in which resonance occurs schematically (e.g. the diagraph in Table 2 could be interpreted as [HAVE NP] or even [V NP]). This is addressed by including presence of at least one priming lexical item, particle or interjection as one of the internal constituents of a resonating construct, e.g. the specific units *a* and *crisis* in example (5) are both 'lexically' re-used by B after A's utterance. This approach draws on the notion of lexical boosting, which suggests that presence of same lexical items of an original prime significantly favours syntactic alignment (cf. Pickering & Ferreira 2008; Pickering & Garrod 2021). Related to condition *a*, in condition *b* I emphasise the importance to limit the annotation of schematic abstraction to the closest node higher up in the network. To fully understand how this works, consider Figure 1 below:

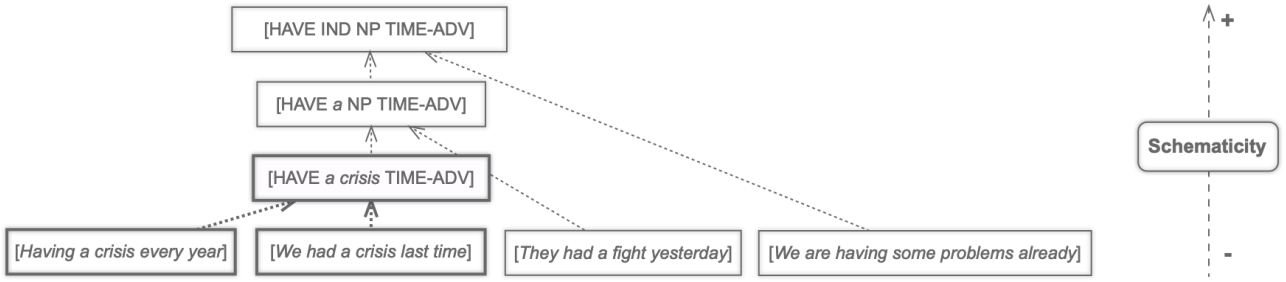

Figure 1.
Schematic abstraction of [HAVE IND NP TIME-ADV]

Figure 1 illustrates an ideal bottom-up process of schematic abstraction involving the categorisation of the [HAVE IND NP TIME-ADV] construction, which in many contexts is semantically associated with a negative experience or situation (in the NP slot, e.g. *crisis, fight, problems*) when that is shared by – at least – two personas. Speakers' ability to 'abstract away' schematic meaning and structure depends on analogy across token instantiations of form and meaning. In the case of example (5), speakers jointly reach the [HAVE *a crisis* TIME-ADV] node during the here-and-now of the interaction via the dialogic schematisation of [*Having a crisis every year*] and [*We had a crisis last time*] (all three constructions are represented in thicker boxes in the figure).

This is the closest node possible which can be identified for the annotation of dynamic resonance in example (5) and therefore what should guide the rationale for a corpus-based DCM. If turns-at-talk in (5) had also included the expression [*They had a fight yesterday*], then the closest node would have been the more schematic node [HAVE *a* NP TIME-ADV], as the NP slot would no more be limited to the specific word *crisis*. Similarly, a higher node would be reached if the exchange would also include [*We are having some problems already*], as in this case the article *a* could be replaced by similar indefinite determiners (e.g. *some*), and so on. What this means is that speakers' capacity to 'abstract away' both linguistic and socio-normative categories out of particular utterances (and events) is bound to analogy among at least two similar, albeit not identical, constructs.

Shared categorisation involves engagement. What this book will show is that a large scale statistical analysis based on the DCM can shed light on the degree of speakers' pragmatic involvement in one

another's talk and proactive re-use of one another's language as a sign of relevance acknowledgment. The exchange below is one where the input lines for RC in both interlocutor B's turns would correspond to 0:

(6)

A: […] I'm talking about cord and five lines here for the minute <pause> aye <pause> and I'm talking about bringing in <pause> talking about bringing in four or five lines down there, right?

B: **mm, mm.**

A: and there's not any reason why once your in you canne put another couple of lines in, and you can even put a couple of lines in on a different number if you want

B: **mm** <pause>

A: but still have to four phone in for the same purpose, are you with me?

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The dialogue in (6) is about arranging several connection lines for a particular event. A is making sure that the 'plan' will be implemented. At some point, A directs B's attention to the ongoing interaction via the metalinguistic construction [*Are you with me*?] to make sure that B is properly engaged with what is being said. The idiom is used to realise a directive speech act, involving a 'relevance checking' strategy. This is to put pressure on the addressee to produce a more substantial contribution to the dialogue. What is key in (6) is that B's engagement with A on record is very poor, as all she provides are mere backchannels, yet without any propositional information being reciprocated in return (cf. Culpeper & Tantucci 2021; Tantucci et al. 2022). In other words, B does nothing more than acknowledging A's information, with no diagraphs emerging as a result: resonance (which is an important albeit not the sole indicator of engagement) here is absent.

The dialogic categorisation model (DCM) is most powerful when it is based on a large scale multifactorial scheme of annotation, as it can aid the statistical and machine-learning prediction of the formal, behavioural, and contextual covariants that significantly contribute to the assessment of recombinant creativity (RC) in naturalistic interaction. Some implementations of this will be introduced in the following chapters.

In the last few years, a new quantitative turn has been emerging in Pragmatics' research (Culpeper & Gillings 2019), with the aim of providing tools to measure implied meaning in context on a large scale. The present DCM is in line with this trend in that it can inform the degree to which interlocutors overtly engage with one another's language through dialogue. Most importantly, it provides the methods to enquire whether such engagement is creative and therefore pro-actively geared towards reciprocity (Tantucci et al. 2018; Culpeper & Tantucci 2021; Tantucci et al. 2022) and the continuation of information flow. Finally, it also provides the tools to assess the degree of schematic abstraction that is achieved from one turn to another in conversation.

Chapter 3
Recombinant creativity in (dis)agreements: A cross-cultural approach to adult Mandarin and American English interaction

This chapter puts the dialogic categorisation model (DCM) into play to compare speech acts of agreement and disagreement in Mandarin and American English. This is to show how RC varies cross-culturally and how this reflects varying degrees and modalities of engaging behaviour in

conversation. Results from a mixed effect linear regression and hierarchical clustering model (Gries 2010; Tantucci 2020; Tantucci & Wang 2022a) show that recombinant creativity (RC) is present in both speech acts of agreement and disagreement, but is significantly more prominent in Mandarin conversation, suggesting a cross-cultural mismatch of overt engagement and resonance with an interlocutor's speech.

The first influential study on the pragmatics of (dis-)agreement is Pomerantz (1984), which assumed that agreement should be the preferred response to a statement (Greatbatch 1992). Leech (1983 2005) also proposed that agreement tends to be the polite response in both Eastern and Western contexts, while disagreement is subject to mitigation strategies e.g. delay, hesitation, or temporising expressions. Disagreement, is classified as strong vs mitigated (Pomerantz 1984; Rees-Miller 2000; Angouri & Locher 2012). The former occurs in turns "containing exclusively disagreement components", the latter "in combination with agreement components" (Pomerantz 1984: 74).

Disagreement may also involve rapport enhancement in specific contextual environments (cf. Spencer-Oatey 2008). For instance, strong disagreement is employed as form of engagement in Jewish culture (Tannen 1984; Blum- Kulka et al. 2002; Ben-Menachem & Livnat 2018). This also applies to Greek naturalistic interaction (Tannen & Kakava 1992; Georgakopoulou 2001; Koutsantoni 2005). Interestingly, disagreement is subject to conventionalisation (Schank & Abelson 1977), such as in contemporary political discourses (i.a. Kleinke 2010; Dori-Hacohen and Shavit 2013; Livnat and Kohn 2018). The interplay between context and (dis)agreement has been discussed in in Kotthoff (1993), Myers (1998), Yaeger-Dror (2002), Clayman and Heritage (2002), Tannen (2002), and Netz (2014), among others. (Dis)agreement is also at work in strategies for politeness between American English and Chinese, and intra-culturally in Chinese conversation (Liang & Jing 2005; Zhu 2014; Chu 2016).

The data for this study are retrieved from the Callhome corpora of Mandarin Chinese and American English, each of them consisting of 120 unscripted telephone conversations between family members, comprising 250,000 words each[5]. The retrieval included 1,000 instances agreement and disagreement turns from each corpus. The selection criteria are based on adjacency pairs where the response would collocate (or be acceptable with) a preceding pragmatic marker 是的 *shìde* 'it is so' / 对 *duì* 'correct' versus 不是 *bùshì* 'it is not (the case)' / 不 一定 *bùyīdìng* 'not necessarily' for Mandarin, and *I agree* / *absolutely* vs *I don't agree* / *not necessarily* for the English data (cf. Tantucci & Wang 2021, 2022a).

The multifactorial annotation is based on the DCM (cf. Chapter 2) and accounts for whether the utterance is one of agreement vs disagreement, the language (Chinese, English), whether peripheral pragmatic markers of intersubjectivity are present (PM), and which ones are they (PMs). The scheme also includes the source of resonance (i.e. whether speaker B resonates with speaker A, with him/herself or both), the degree of resonance occurring lexically, the one of resonance occurring syntactically, and finally the distance between the original utterance and the resonating construction. A sample row (out of 2,000 for the two corpora) of the input of these dimensions is given in Table 4:

[5] https://ca.talkbank.org. Last accessed 14/06/22.

(Dis)agreement	Language	PM	PMs	Source	Lexical resonance	Syntactic resonance	Distance
Agreement	English	Yes	You know	Other	4	3	2

Table 4.
Input for DCM annotation of Resonance in Mandarin vs English interaction

The count of lexical resonance depends on the number of words or interjections that are reused by the interlocutors. Syntactic resonance is different in that it captures degrees of RC, that is the internal constituents of schematic constructions that display structural analogy (see DCM in Chapter 2). Finally, the measurement of distance is based on the number of intonation units (IUs; cf. Chafe 1994; Croft 1995; Du Bois et al. 1993; Tao 1996). Example (7) may serve as an illustration of the annotation procedure:

(7)

A: I mean **he would just have a miserable time**.
B: Oh, **this would be a great time**, even Norman.

Callhome / Eng / 4790

In (7) the priming construction [*he would just have a miserable time*] is creatively recombined by B in the form of [*this would be a great time*]. This leads to the dialogic categorisation of the more schematic structure [Subj *would* Verb *a* Adj *time*], as shown in the diagraph in Table 8:

	Subj	*would*	Verb	*a*	Adj	*Time*
A	*he*	*would*	*just have*	*a*	*miserable*	*time*
B	*this*	*would*	*be*	*a*	*great*	*time*

Table 8.
Diagraph [Subj *would* Verb *a* Adj *time*]

B's utterance involves disagreement. It includes the left peripheral interjection *oh*, to be added to the two columns for pragmatic marking PM and PMs (cf. Table 4). The source of resonance is marked as 'other', in that B does not resonate with her own utterance (that would be a case of self-expansion, to be tagged as 'self'), nor does resonance result from both interlocutors' utterances (tagged as 'combined'). The value for lexical resonance is 3, due to the specific words *would, a* and *time* being reused by B. The value of syntactic resonance is 6, amounting to the sum of the constituents of the emerging dialogic construction [Subj + *would* + Verb + *a* + Adj + *time*].

The DCM allows to quantitatively measure recombinant creativity in naturalistic conversation. A visual representation of degrees of syntactic and lexical resonance, as well as the distance from the original prime in the two populations is given in Figure 2 below:

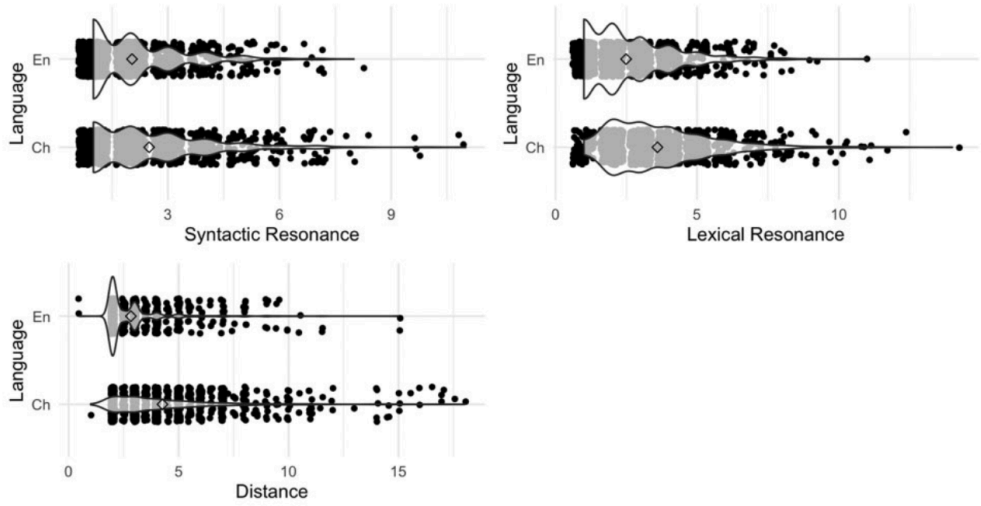

Figure 2.
Syntactic resonance, lexical resonance and distance in Chinese versus American English interaction.
(Tantucci & Wang 2022a: 132)

Figure 2 includes three violin plots, all smoothed by a kernel estimator. In all three, we can see a longer density distribution for the Chinese data, with higher means, expressed by a diamond-shaped point (◇) at the centre. Resonance is both syntactically and lexically more prominent in naturalistic Chinese conversation, as shown by higher means in the upper part of the figure. Dialogic priming is also longer lasting for Chinese speakers, who seem to engage in interaction by resonating after longer turns at talk, with a mean rate of almost 5 TUs, in contrast to 2.6 in American English.

This mismatch can be captured statistically with a mixed effects linear regression model (cf. Baayen & Davidson 2008) with syntactic resonance as a response variable, distance from one diagraph to another as a random effect and source of resonance, lexical resonance, and pragmatic marking as fixed effects, as shown in Table 9:

Random Effects				
Groups	Name	Variance	Std. Deviation	
Separation	(Intercept)	7.582E-02	0.008707	
Fixed Effects				
	Estimate	Std. Error	T value	Pr(>|t|)
(Intercept)	-0.095	0.073	-1.295	0.196
Disagreement	0.049	0.059	0.836	0.403
Source_other	-0.303	0.053	-5.658	3.69e-08***
Source_self	-0.233	0.087	-2.674	0.00763**
Lexical resonance	0.734	0.013	53.789	<2e-16***
PM	0.156	0.049	3.175	0.00155**

*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'*

Table 9.
Mixed effects linear regression of the factors contributing to syntactic resonance in Chinese

In Table 9, the random effects section includes the standard deviation, displaying the variability from the predicted values due to the random effects added to the model, i.e. the number of IUs occurring from one diagraph to another. In the fixed effects section, the estimate column indicates the coefficients of the slope of syntactic resonance, namely disagreement, source of resonance, degree of lexical resonance and presence of pragmatic markers.

These results show that recombinant creativity (RC) is not affected by (dis)agreement in Chinese. On the contrary, resonance is significantly at play as a combined phenomenon among interlocutors, as both 'other' and 'self' show negative coefficients and T-values (Source_other, (288) = -0.3, T = -5.66, p < 0.0001; Source_self, (950) = -0.23, T = -2.67, p < 0.0001). Expectedly, when resonance occurs lexically, it boosts RC (Lexical resonance, (990) = 0.73, T = 53.79, p < 0.0001). This means that phonetic similarity across turns is an important predictor of constructional analogy and RC. Finally, there is a key correlation between syntactic resonance and pragmatic marking, showing that RC is significantly associated with intersubjectivity in Chinese (Tantucci & Wang 2018; 2020a, 2020b; 2022a 2022b; Van Olmen & Tantucci 2022).

These results can now be compared with the English data set in Table 10:

Random Effects				
Groups	Name	Variance	Std. Deviation	
Separation	(Intercept)	7.582E-02	0.008707	
Fixed Effects				
	Estimate	Std. Error	T value	Pr(>|t|)
(Intercept)	0.448	0.077	5.786	2.77e-08 ***
Disagreement	0.071	0.119	0.596	0.5516
Source_other	-0.145	0.074	-1.960	0.0558
Source_self	-0.069	0.074	-0.937	0.3513
Lexical resonance	0.043	0.015	44.098	< 2e-16 ***
PM	0.157	0.049	873	0.3830

*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'*

Table 10.
Mixed effects linear regression of the factors contributing to Syntactic resonance in American English

Table 10 shows that in American English RC is not affected by combined forms of resonance. The only significant predictor is lexical resonance, also showing that lexical similarity is a booster of dialogic categorisation. Importantly, presence of pragmatic markers of intersubjectivity is not a significant predictor of RC as it was for Chinese data. This is a fundamental finding, as it shows that dialogic similarity and creativity are paired with overt use of intersubjective pragmatic marking in Mandarin, but not as much in American English.

The chapter also provides the machine learning results of hierarchical clustering (Steinbach et al. 2000), which can be used to differentiate senses and forms of a lexeme (cf. Gries 2010; Jansegers &

Gries 2017: 3) or a speech act (Tantucci & Wang 2018; 2020a). Here it draws on the multifactorial scheme given in Table 4 to show how the usage of pragmatic markers aids the prediction of cross-cultural diversity, when resonance is at work[6]. In the usage-based literature, there is a substantial strand of research concurring on the relationship between sentence peripheral presence of pragmatic markers and intersubjectivity (i.a. House 2013; Fitzmaurice 2004; Traugott 2012, 2016; Haselow 2012; Brinton 2017; Tantucci 2013, 2016a, 2016b, 2017a, 2017b, 2021; Tantucci & Wang 2018, 2020a, 2020b). Interlocutors resort to PMs when they overtly signal their awareness of the addressee's potential reactions to what is being said (Tantucci 2021).

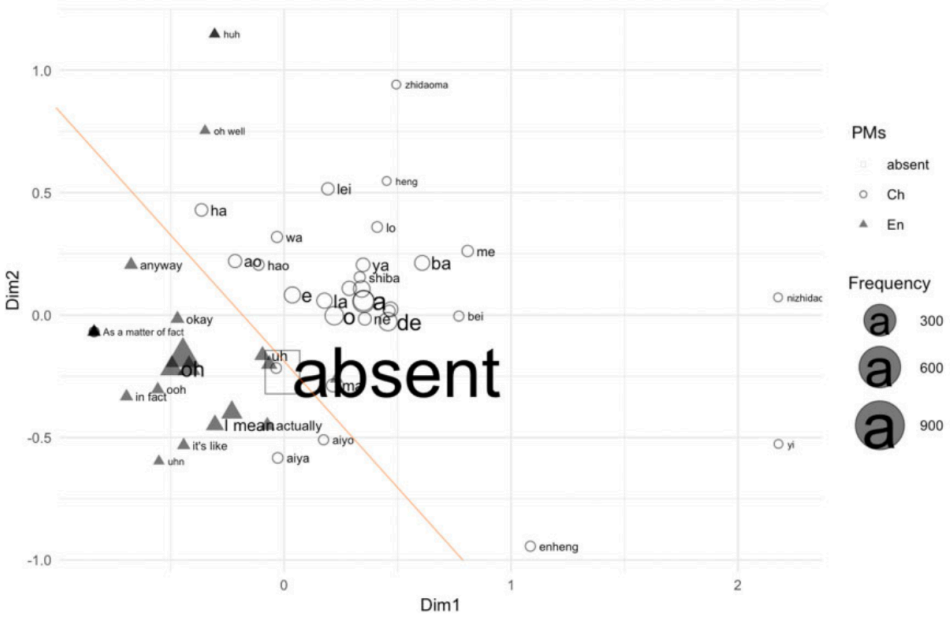

Figure 3.
Hierarchical clustering of based on structural and pragmatic similarity of PMs usage.

In Figure 3, increasing distances across Dim1 and Dim2 on the x and y axes express interactional dissimilarity, while the size of each label indicates frequency. All the PMs that the machine predicts to belong to English are marked with triangles (▲), while the ones for Chinese are marked with empty circles (○), finally, absence of PMs is signalled by an empty square (□). Apart from a few outliers (e.g. *huh, oh well, aiyo, aiya*), the model provides an accurate classification of the PMs in the two languages, with Chinese PMs clustering around the centre of the map and English PMs converging towards the bottom left hand side. Absence of PMs is located in between the two groups. The two clusters are separated by a red diagonal line, which clearly differentiates languages based on on PM usage when resonance is present.

Based on these and other analyses, the chapter shows that RC across utterances can be a predictor of language diversity and cross-cultural behaviour. RC is equally present in speech acts of agreement and disagreement in Chinese and American English. However, it is at play to larger extent in Chinese interaction, encompassing longer stretches of discourse and analogy across utterances both lexically and schematically.

[6] 'Language' as a variable was therefore not included in the model, as the aim was to 'predict' cultural and language diversity.

Another important finding is that dialogic engagement significantly correlates with RC in presence of pragmatic marking. The convergence of these two dimensions also varies cross-linguistically and can aid the machine learning discernment of language diversity and cross-cultural behaviour. This shows the crucial importance of incorporating usage-based behaviour from naturalistic interaction for the design of conversational interfaces. Increasingly sophisticated AI models can draw on this kind of data to simulate engagement at the interactional pragmatic level, and not merely at the propositional one. Major achievements in AI involve convolutional neural networks. This technology is centred on visual receptive fields, however many other applications are yet to be developed (Zador 2019: 6), such as ones hinging on mirror neurones (Arbib 2012) or mindreading (Tomasello 2008; Apperly 2010; Tantucci 2021) abilities. This chapter shows that RC could be one of them and may represent a powerful resource for future development of engagement and cross-cultural categorisation of conversational interfaces in human–machine interaction. This entails that machine would be able to rely on a large multifactorial training set to explore possible ways to creatively interact with what has been said by the interlocutor, rather than merely using on prefab expressions (Bybee 2010) or fixed formulas already stored 'as such' in the memory. In this respect, AI systems, such as the COLIBRI poetry generator (Díaz-Agudo et al. 2002) or the MuzaCazUza music generator (Ribeiro et al. 2001), rely on user-given, high quality artefacts to generate new material. Such models involve the elaboration of an input for creatively producing a new 'object'. What the present book aims to provide is a multifactorial dialogic input that would allow a machine to 'resonate' creatively with what is being said by her interlocutor. While the monograph provides case-studies based on machine-learning models that allow to identify the correlation between covariants and resonance in human naturalistic interaction, the DCM input could be used for deep-learning models in AI design.

Chapter 4
Recombinant creativity in First Language Acquisition: Engagement and flexibility in Mandarin assertions

The chapter is centred on the the relationship between priming (Bock 1986; Pickering & Branigan 1999) and recombinant creativity (RC) throughout children's ontogenetic development. It shows that children significantly acquire the ability to creatively reuse a dialogic prime around age 4, distinctively in combination with sentence final particles (SFP) of intersubjectivity. These results provide an important contribution to on-going research on priming, as they indicate that in first language acquisition (FLA), the ability to creatively reuse utterances from others is developmentally correlated with explicit dialogic engagement and intersubjectivity. In other words, RC is a cognitive mechanism that develops alongside engagement and intersubjective capacities to project interlocutors' potential reactions to what is being said (cf. Tantucci & Cristofaro 2021).

In cognitive psychology, syntactic priming occurs when speakers repeat a morphosyntactic structure that they have previously heard/said (Bock 1986; Pickering & Branigan 1999). Traditionally, priming is often seen as a key mechanism for learning (e.g., Bock & Griffin 2000; Chang et al. 2000; Luka 1999) and strengthening linguistic representations (e.g., Savage et al. 2006). It is often suggested that priming occurs implicitly (Bock & Griffin 2000; Chang et al. 2006), therefore not correlating with interactional engagement and/or constructional meaning. For this reason, in FLA priming effects have been traditionally studied in presence of underlying syntactic rather lexical representations in children aged 3 and older (e.g., Branigan et al. 2005; Messenger et al. 2011; Shimpi et al. 2007, but see Savage et al. 2003). This is often seen as evidence of children's capacity

to acquire morphosyntactic knowledge (Pickering & Branigan 1998; Benicini & Valian 2008; Huttenlocher et al. 2004; Savage et al. 2003, 2006). In some studies, explicit processes have also been considered when lexical overlap is at play between prime and target (Branigan et al. 2000). The present chapter provides evidence to show that RC involves engagement in FLA. In Mandarin child-carer conversation, RC occurs in combination with an extra-propositional "surplus" element of sentence final particles (SFPs) to markedly express dialogic engagement.

Children develop the ability to express intersubjective functions of SFPs as markers of overt engagement around age 4 (Tantucci & Di Cristofaro 2021; Tantucci & Wang 2021b). This is also when increasingly sophisticated mindreading abilities reportedly allow children to pass false-belief and perspective-taking tasks (e.g.Goldman 2006; Apperly 2010). In the excerpt (8) below, the child (CHI) resonates with his mother's (MOT) utterance in two ways. He first resonates statically, thus without providing any creative contribution to the ongoing interaction, with no RC is involved. He then enquires about the original directive speech act and resonates with the original verb 拼 *pīn* 'arrange' with the surplus addition of the SFP 啊 *a*. The latter is often used to set up close relations and express engagement in questions (cf. Chappell & Peyraube 2016: 323; Tantucci & Wang 2018).

(8)

MOT: 我们把这个四边形拼好。
wǒmen bǎ zhège sìbiānxíng pīnhǎo
we BA this CLAS2 quadrilateral/cube arrange
'Let's arrange these cubes.'

CHI: 四边形。
sìbiānxíng
quadrilateral/cube
'Cube'.

CHI: 怎么拼的啊?
zěnme pīn de a
how arrange DE A
'How do you arrange them then?'

CHILDES / Zhou3 / 1878 / 2;05
(Tantucci & Wang 2022b: 4)

This is an example of dialogic co-occurrence of RC with markers of intersubjective engagement. The child's speech shifts from static (merely repeating the word 四边形 *sìbiānxíng* 'quadrilateral/ cube') to dynamic resonance, as the verb 拼 *pīn* "arrange" is reused to gather further information about how to fulfil a specific task. This occurs in combination with the sentence peripheral marker of dialogic engagement 啊 *a*.

The data for this analysis were retrieved respectively from the Zhou3 (cf. Zhang & Zhou, 2009) and Zhou2 (cf. Li & Zhou, 2004) corpora of Mandarin FLA. Both corpora include interactions between children and their caregivers. Data from the two corpora were normalised based on age spans and the context was restricted to episodes of play among the child and the mother (Tantucci & Wang 2022c). The DCM annotation included the age of the child (the number of months), whether the utterance included a sentence final particle (SFP), the source of resonance, dynamic vs static resonance, the degree of lexical resonance, the degree of syntactic resonance and, finally the

distance between the prime and the resonating construction. In (9) an example of RC in the child's speech is given:

(9)

MOT: **这个好像是带帽子的吧。**
zhè ge hǎoxiàng shì dài màozi de ba
this CLAS apparently be wear hat DE BA
'It looks like this is wearing a hat isn't it?'

CHI: **嗯。**
en
yeah
'Yeah.'

CHI: **这个好像是这样搞的。**
zhè ge hǎoxiàng shì zhèyàng gǎo de
this CLAS apparently be so make DE
'It looks like this is made like that.'

CHILDES / Zhou2 / 55068 / 4;06
(Tantucci & Wang 2022c: 9)

In (9) above MOT and CHI are looking at an illustrated book. MOT establishes joint attention with CHI with the construct [这 *zhè* 'this' 个 *ge* CLAS 好像 *hǎoxiàng* 'apparently' 是 *shì* 'be'] and the intersubjective SFP 吧 *ba* 'isn't it'. CHI is 54 months old, and his utterance does not include an SFP. The source of CHI's resonance is marked as 'other', as it exclusively originates from MOT's utterance. MOT's construction is then creatively recombined by the child, as he notes how the character was realised [这 *zhè* 'this' 个 *ge* CLAS 好像 *hǎoxiàng* 'apparently' 是 *shì* 'be' 这样 *zhèyàng* 'so' 搞 *gǎo* 'done' 的 *de*] and is thus marked as dynamic resonance. The value of lexical resonance is 5: 这 *zhè* 'this' 个 *ge* 好像 *hǎoxiàng* 'it seems' 是 *shì* and 的 *de*. At the syntactic level, resonance has a value of 6. This depends on the internal constituents of the more schematic construction [DEM CLAS EVD 是 *shì* VP 的 *de*]. Finally, the distance from the prime to the CHI's resonating construct is 2, comprising the first IU 嗯 *en* 'right' and the following one. The diagraph of the emerging dialogic construction is given in Table 11:

	DEM	CLAS	EVD	*shi*	VP	*de*
MOT	这	个	好像	是	戴帽子	的
CHI	这	个	好像	是	这样搞的	的

Table 11.
[DEM CLAS EVD *shi* PREDICATE *de*].

This annotation process is then applied to all of the 2000 occurrences of resonance in the two corpora. A good model to assess whether RC leads to overt intersubjective engagement in FLA is a conditional inference tree (cf. Hothorn et al. 2006; Tagliamonte & Baayen 2012). This is useful for explanation and interpretation, as it allows a visual illustration of the conditional dependencies that lead to the response variable (cf. Levshina, 2021: 614), i.e. the presence of SFP. Significant predictors were Resonance type, Syntactic resonance, and Age.

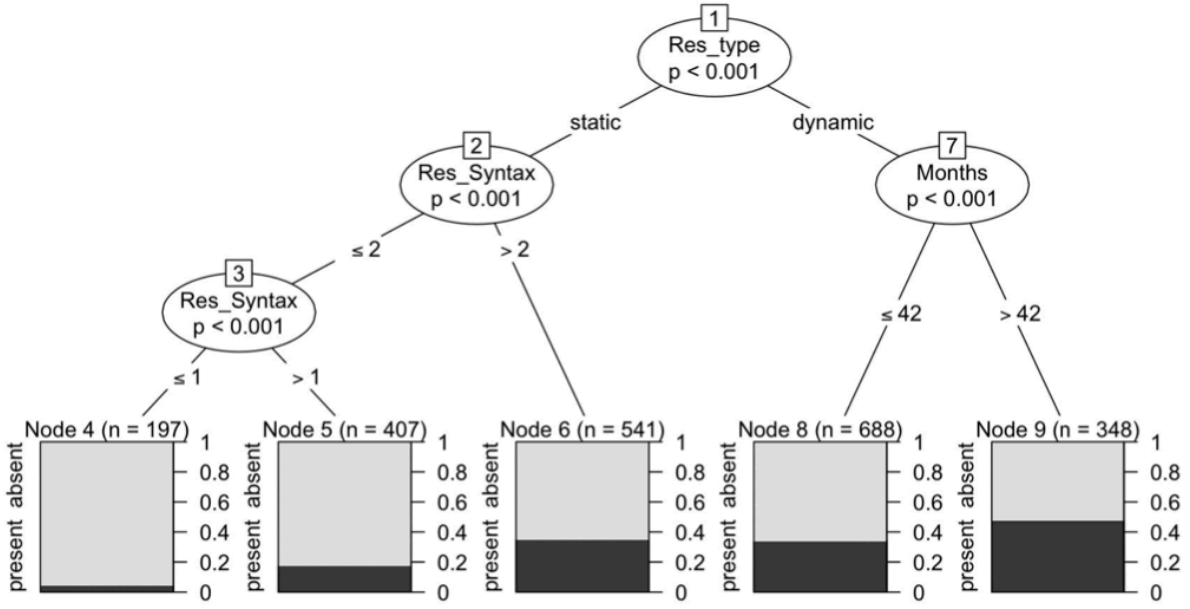

Figure 4.
Conditional inference tree of the relationship between CHI's age, resonance type, and SFPs.
(Tantucci & Wang 2022b: 13)

The conditional dependencies of the plot are based on statistical significance (the higher the node, the more significant the partition of each split) with p-values depending on χ^2 distribution (Hothorn et al., 2006). The descending order of each node represents a significant condition for assessing whether children make use of SFPs when resonance is involved. This finally leads to the bar plots at bottom, with percentages of usages that include a SFP (present) versus ones that are without (absent). Many interesting results emerge from this, however what is most crucial for the present discussion is the right-hand side of the plot. Namely, the proportion of SFPs increases together with dynamic resonance and, therefore, as a result of RC. In particular, the split at node 7 shows a significant increase of this correlation after 42 months of age, with spontaneous usage of SFPs raising from around 38% (node 8) to almost 50% (node 9).

These results indicate that children's capacity to re-use creatively their interlocutors' utterances increases significantly after 42 months of age. This is matched by the ability to overtly engage with their interlocutors via SFPs of intersubjectivity. Spontaneous usage of peripheral markers of intersubjective engagement represents a key indicator of children's increasing ability to proactively account for the addressee's potential reactions to what is being said (cf. Tantucci & Wang, 2020a, 2020b, 2022a), rather than reacting implicitly to a priming stimulus.

This is confirmed with a mixed effect linear regression model (cf. Baayen et al. 2008) specifically centred on RC in presence of SFPs. Dynamic resonance was fitted as a continuous response variable, the child's name as a random effect, and children's age as a continuous fixed effect.

Random Effects			
Groups	Name	Variance	Std. Deviation
Child	(Intercept)	0.0256	0.160
Fixed Effects			

	Estimate	Std. Error	T value	Pr(>|t|)
(Intercept)	1.748	0.212	8.214	1.26-08 ***
Age	0.011	0.0047	2.260	0.0244**

*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.'*

Table 12.
Mixed effects linear regression of the FLA of syntactic resonance in combination with creativity and SFPs.

The table shows a significant increase of RC combination with age when SFPs are spontaneously used as an overt surplus of meaning at the end of the sentence ($t(394) = 2.260$, $p = .0244$)). When the child creatively reuses the dialogic input that s/he has been primed by, that is an important indicator of a developing ability to engage with an interlocutor and to meet intersubjective expectations of originality and transmission of new information. Throughout Chinese FLA, there is a significant transition from resonance occurring as mere repetition, to analogies realised as forms of RC. This ability develops significantly in combination with sentence final particles (SFPs) of intersubjective engagement. In Mandarin and other languages of the Southeast, SFPs occur as non-obligatory grammaticalised markers that speakers use to express their concern about the addressee's reaction to what is being said. The complex system of SFPs is a key typological resource for the study of intersubjectivity and mindreading in cognitive science. This correlation indicates that dialogic creativity unfolds as a recombinant mechanism in which interlocutors overtly engage with the linguistic material produced by their peers. Such form of recombinant creativity is a gradient one and increases in complexity throughout ontogeny.

Chapter 5
Recombinant creativity in Autism Spectrum disorder: Creativity competing with engagement

This chapter accounts for the relationship between recombinant creativity (RC) and intersubjective engagement in ASD vs neurotypical populations' speech. It compares two balanced corpora of naturalistic Mandarin interaction of typically developing children and ones diagnosed with ASD and shows that in both neurotypical and ASD populations resonance correlates with engagement. However, creativity and intersubjective engagement tend to be in competition with one another in children with ASD in contrast with neurotypical ones. This remarkably suggests a relatively impeded RC ability in ASD during the here-and-now of a dialogic event. This, in turn, may indicate that what is impeded in ASD is not necessarily a mindreading capacity, but rather the ability to engage with dialogic stimuli creatively and rapidly.

Many speakers with ASD develop semantic language skills that are comparable to the typically developing (TYP) population. However, ASD individuals tend to have more impeded pragmatic abilities, with negative repercussions on engagement in reciprocal conversations (Eigsti et al., 2011; Howlin et al., 2013; Knott et al., 2006; Volden, 2017). Lower ratings of conversational flow in interactions among friends are noted for ASD vs TYP populations (Bauminger et al., 2008). ASD interaction is reported to include lack of eye contact (Ames & Jarrold, 2007; Hobson & Lee, 1998; Pisula, 2010; Tager-Flusberg, 1999; Wiklund, 2016) and echolalia (Sterponi & de Kirby, 2016). ASD individuals often show struggle to adapt to common ground (i.e. Gernsbacher et al., 2005; Lord & Paul 1997; Tager-Flusberg 2000; Tager-Flusberg et al., 2005), and try to avoid redundant

messages (e.g. Asp & de Villiers, 2010; Baixauli et al., 2016; Baltaxe & D'Angiola 1992; Colle et al. 2008; Diehl et al., 2008; Eales, 1993; Fine et al., 1994; Surian et al. 2007). Other dialogic limitations include initiating conversation, repairing misunderstandings, perseverating on topics, and making topically relevant comments (Kissine, 2012; Loveland et al., 1988; Volden, 2017). In Conversation Analysis, Ochs et al. (2005) and Dobbinson et al. (1998) noted difficulties in conforming to conversational rules such as initiating and engaging in reciprocal conversations (Ball 1978; Baltaxe & Simmons 1977; Fine et al., 1994) with reduced ability to engage in shared attention (Rollins & Snow 1998). There is finally an important research strand in both Discourse and Conversation Analysis which has been paving the way for new models of investigation that are centred on the linguistic sequences that are spontaneously produced by individuals with ASD (cf. Sterponi 2004, 2017; Sirota 2004; Ochs and Solomon 2004; Solomon 2004; Maciejewska 2019). Hobson et al. (2012) suggest a close relation between ASD impairments in intersubjectivity and impeded resonance. In Du Bois et al. (2014) participants ASD could resonate with an interviewer's speech, but often failed to re-use the utterances to provide a coherent expansion of their own. Apart from the last two studies, research on ASD speech have been mostly confined to a lab environment and artificial experimental setting (Apperly 2010; Tantucci 2020, 2021; Sng et al. 2020). This chapter is rather centred on large scale naturalistic interaction and ASD individuals' capacity to re-use a prime in a novel way as a byproduct of engagement. While it has been attested that, to some degree, children with ASD are able to learn new semantic information in context (Lucas et al. 2017), it is yet to be determined whether their RC ability is comparable to TYP populations and whether are they able to proactively inhibit repetitive behaviours in conversation (cf. Tantucci & Di Cristofaro 2020).

The data for neurotypical children are retrieved from the Zhou3 (cf. Zhang & Zhou, 2009) and Zhou2 (cf. Li & Zhou, 2004) corpora of first language acquisition, with a selection of interactions that exclusively included children talking with their mother. Similar to what is done in Chapter 4, data from the two corpora were normalised based on age-spans and corpus size, leading to an overall TYP corpus comprising 12,286 utterances. The Shanghai corpus of ASD speech comprises interactions with children speaking with their mother raging from 37 to 56 months of age, with a total of 17,686 children's turns at talk. The first 500 cases of resonance occurring statically or creatively were selected from children from the TYP and the ASD corpora respectively, ranging from 48 to 54 months of age. The same was done for children ranging from 55 up to 60 months old (Tantucci & Wang 2022b).

For the present analysis, the same multifactorial DCM that is illustrated in chapter 4 is adopted. One of the advantages of the DCM is its replicability for applied research, as it allows to quantitatively measure different population's resonance and overt interactional engagement.

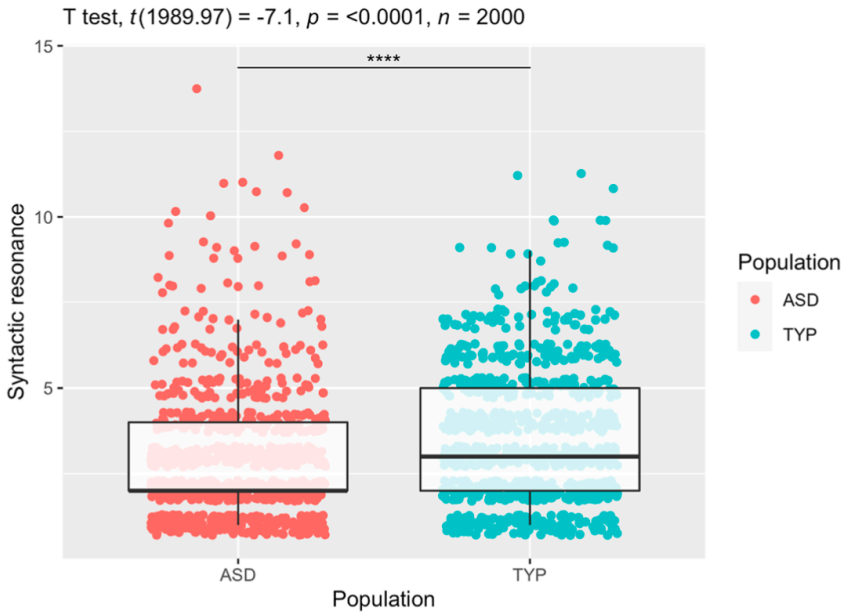

Figure 5.
Degree of syntactic resonance in ASD and TYP populations
(Tantucci & Wang 2022a: 8)

The boxplot in Figure 5 indicates that syntactic resonance as a whole is produced by a significantly larger degree in TYP children (in green) in contrast with children with ASD, in red ($t(1989) = 7.1$, $p < 0.0001$, $n = 2000$). This means that, when resonance occurs, a significantly higher proportion of schematic linguistic input is reused – either creatively or statically – by TYP children throughout naturalistic interaction. Interestingly, this a mismatch appears to be gradient, rather than reflecting an absolutely impeded capacity of children with ASD to resonate with their interlocutors. This supports the view that interactional engagement is partly – rather than entirely – impeded in children with ASD, with weaker, rather than missing capacity to re-elaborate dialogic primes of their interlocutors (e.g. Du Bois 2014; Hobson et al. 2012; Kissine 2021). Concerning RC, the mismatch between the two populations is even more prominent, as shown in Figure 6 below:

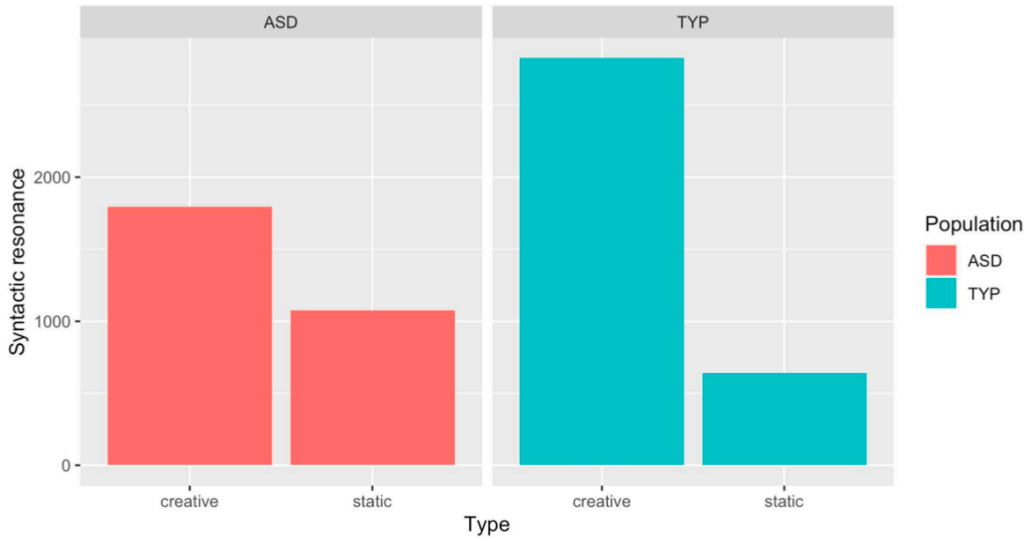

Figure 6.
Barplot of creative vs static resonance in ASD vs TYP populations
(Tantucci & Wang 2022a: 9)

The remarkable difference between creative vs static resonance in the two populations suggests a more impeded RC capacity in children with ASD. That is, ASD children do engage with dialogic primes, however the show a less fluid ability to provide a new contribution to the here-and-now of the interaction.

Even more relevant is whether RC relates to intersubjectivity in the two populations. This mismatch can be captured in multifactorial terms, with a conditional inference tree model (cf. Hothorn et al. 2006; Tagliamonte & Baayen 2012; see Ch. 4).

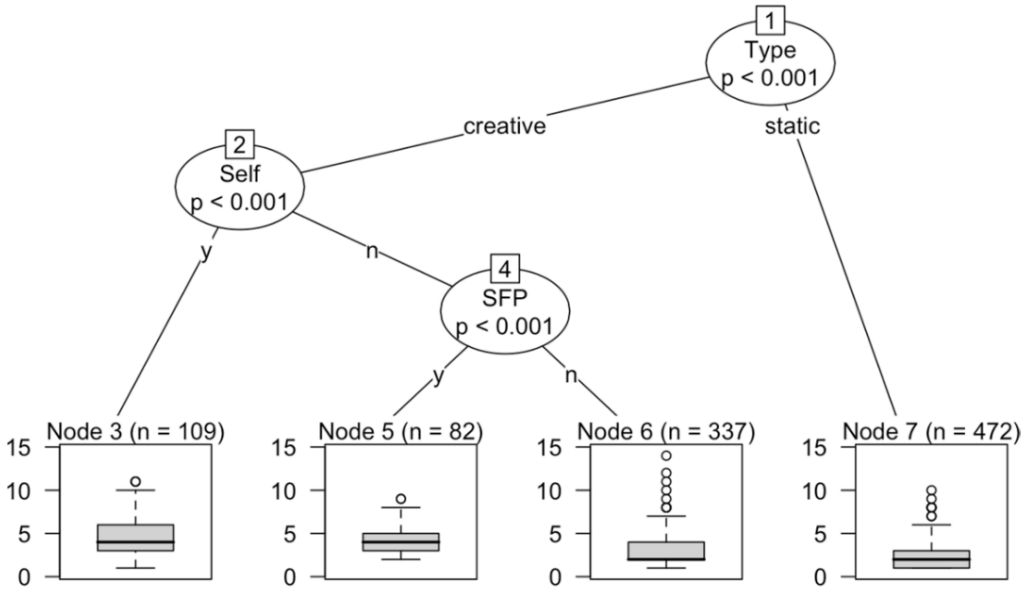

Figure 7.
Conditional inference tree for the prediction of syntactic resonance in the ASD population

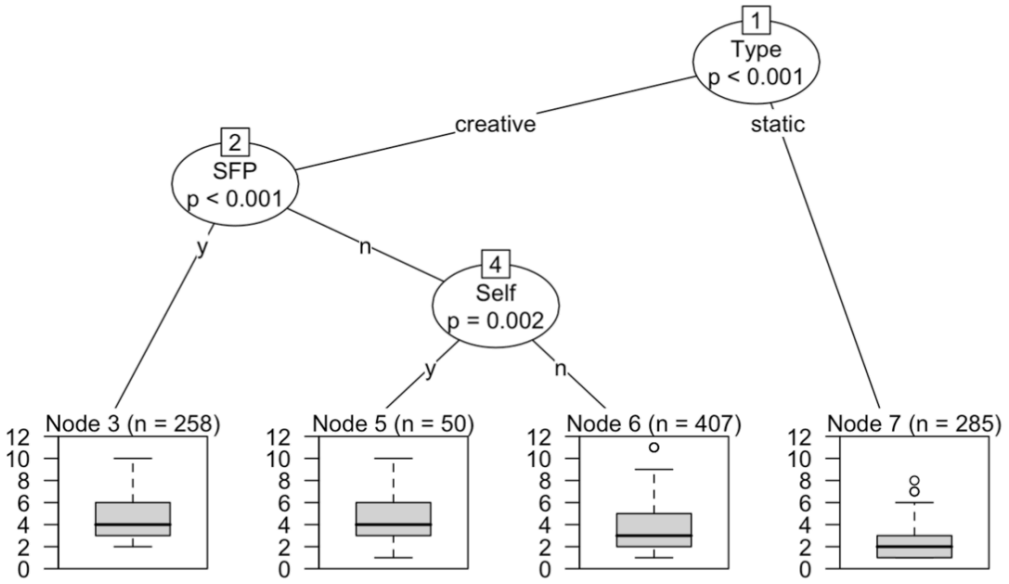

Figure 8.
Conditional inference tree for the prediction of syntactic resonance in the ASD population
(Tantucci & Wang 2022b: 11)

Figure 7 shows that TYP children most significantly rely on SFP (as overt markers of intersubjective engagement) when they process highest levels of RC (see nodes 2 to 3). Conversely, Figure 8 shows that in the ASD population RC depends on whether the child creatively resonates with him/herself or with the mother. In fact, values of RC in ASD speech are higher when the child egocentrically resonates with what s/he just said herself (see the relationship between node 2 and 3). This is a fundamental result, as it shows that RC is primarily intersubjective in the case of TYP children, being significantly associated with overt engagement via SFP. Quite differently, children with ASD significantly resonate ego-centrically, viz. when they are themselves the source of their resonating construction.

The present data shows that children with ASD tend to engage with a dialogic stimulus in a somewhat different way than TYP children. Firstly, they display less linguistic engagement as a whole, no matter whether resonance involves RC. Secondly, they also show a relatively impeded ability to creatively recombine a preceding dialogic prime in comparison with the typically developed population. Most crucially, they show an inhibited capacity to engage creatively with linguistic primes in combination with overt sentence final particles of intersubjectivity (SFP). When creativity is at play, ASD children show a clear preference for self-engagement, as they tend to resonate with themselves, rather than with their own interlocutors. This supports the 'gradient' stance towards impeded engagement in ASD that as proposed in Du Bois et al. (2014) and Hobson et al. (2012). However, it also offers new insights on the relationship between creativity and engagement in naturalistic interaction. In the heated debate about the nature of mindreading and intersubjectivity not much emphasis has yet been placed on the non-propositional nature of human interaction, hinging on degrees of engagement that interactants and social members require for successful cooperation (cf. Tantucci, 2021). In this sense, the DCM provides a fine-grained framework for assessing the degrees of engagement and creativity, which in turn need to be assessed in light of high heterogeneity and other nerco-cognitive factors of ASD populations, as 10%–20% of individuals with an ASD have an identified genetic etiology (Bentacur 2011; Wolfers et al. 2019).

The two correlate significantly in neurotypical speech (Tantucci, Culpeper & Di Cristofaro 2018; Culpeper & Tantucci 2021). However, engagement in ASD speech is somewhat preserved at the expense of creativity, and the other way around. Creative re-elaboration of dialogic primes originating from other speakers exists in ASD speech, yet not as an inherent byproduct of engagement. This may suggest that overt interactional engagement involves an explicit choice in the ASD population, whereby executive functioning resources are to be either allocated to RC or to overtly marked engagement with an interlocutor. Put simply, ASD speakers tend to either focus on being 'creative' or being 'social', but struggle more than TYP speakers to do both at the same time. What this approach shows is that interactional engagement in ASD children is not inherently inhibited, but rather as 'one possible choice' of constructional organisation, one that requires a stronger effort in comparison with neurotypical speech.

Chapter 6
Recombinant creativity in Language Change: The [NP-Pp] construction in American English

Recombinant creativity (RC) is not only bound to dialogic resonance, but may occur to inhibit repetitive and conventionalised behaviour. In language change, the recurrent usage of a construction may be significantly counterbalanced with new attempts of so-called 'entrenchment inhibition' (cf. Tantucci & Di Cristofaro 2020), which is the creative recomposition of a conventionalised construction's internal constituency. In such conditions, speakers opt for less predictable ways to express a similar meaning of a conventionalised form, e.g. instead of the conventionalised greeting [*how are you?*] one may say [*how is that you're feeling today?*]. The chapter is centred on the constructionalisation of noun–participle compounds (e.g. *snow-covered*) in the Historical Corpus of American English (COHA)[7]. During the second part of the twentieth century, speakers eventually display RC behaviour, as they inhibit the usage of conventionalised noun phrase–past participle forms [NP-Pp] in favour of more compositional strategies involving the same internal constituents (e.g. opting for *covered with snow* in the place of the more chucked [NP–Pp] *snow-covered*). They start doing this on a large scale despite the conventionalised status of the [NP–Pp] compound, therefore inhibiting its recurrent use. These results additionally inform research in cognitive architectures and artificial intelligence, where creativity is often merely considered as a problem-solving mechanism rather than a potential process of inhibition of automatised behaviour.

Usage-based accounts of language change are traditionally concerned with tendencies towards the repetition and the predictability of verbal behaviour. The focus is traditionally placed on the diachronic relationship between repetition and 'bottom-up' constructional abstraction, which may correlate with entrenchment (cf. Langacker 1987: 59; Croft 2000: 38; Zima & Brône 2015: 488; cf. Schmid 2020 for a key distinction between entrenchment and conventionalisation), and, eventually, increase of schematicity (i.a. Bybee 2010; Traugott & Trousdale 2013: 22; Schmid 2017; Verhagen 2021). Language indeed moves towards the uniformity, automatisation, and predictability (cf. Bybee 2010) of interactional behaviour. However, RC is also a factor in language change, which may involve innovation, but also large scale creative inhibition of conventionalised constructions and behaviours. Indeed, inhibitory control is a major area of research in cognitive science, and creativity does indeed require inhibition of habits (Wood & Neal 2007; Trude & Nozari 2017). This is very common interactionally. For example, despite being aware of a conventional entrenched chunk x [*see you later*], a speaker may decide to utter x ± y [*I'll see you again young man*] (BNC

[7] https://www.english-corpora.org/coha/. Last accessed 28/06/2022.

G5E PS285). This less compositional choice correlates with RC and may be made despite x having been repeatedly proved to be felicitous in the same contextual conditions (cf. Tantucci et al. 2018; Tantucci & Di Cristofaro 2020).

The NP–Pp compounding in American and British English is a highly productive word formation strategy (Fabb 2001: 68; Plag 2003: 153; Bauer 2006: 490; Bauer et al. 2012: 470 and is traditionally associated with the passive voice (e.g. Biber et al. 1999: 534; Huddleston & Pullum 2002: 1659; Quirk et al. 1985: 1577), with heterogenous argument structure (e.g. Plag 2003), and can often be coordinated with adjectives as in *efficient* and *market-oriented* approaches (cf. Hilpert 2015: 117).

This chapter assesses whether diachronically RC is not only a source of innovation, but can also be a competing force of entrenched behaviour and constructionalisation. To study the diachronic competition between entrenchment and RC the present analysis includes the five most frequent nominal first-compound members (fcm) NP–Pps the highest type frequency in the COHA (cf. Hilpert 2015: 127). For instance, for the Pp *based*, the retrieval includes *Atlanta-based*, *Chicago-based*, *land-based*, *New York-based* and *Washington-based*. A second step is gathering all the occurrences where the top five most frequent NPs of each NP–Pp type would collocate periphrastically, i.e. within a seven words span to the right of their Pps, e.g. from *Chicago-based* to *based in Chicago,* or from *smoke-filled* to filled *with a lot of smoke* and so on (cases where NPs would not be syntactically related to Pps were manually excluded). All NP–Pp compounds that do not include a periphrastic alternative in the corpus are excluded, for instance in the COHA, there are no periphrastic alternatives to *business-minded* such as **minded towards business*. A final step is to isolate a subset of Pps that did not collocate with their NP in the first part of the COHA, e.g. [*colored* 7R *cream*] (7R means "within a 7 word-span at the right of *colored*"), [*eyed* 7R *goggle*].

Most frequent Pps in [NP-Pp] compounds	**Top five NPs in each compound**
based	*Atlanta; Chicago; land; New York; Washinton Brooklyn; earth; heaven*
born	*Brooklyn; earth; heaven*
bound	*east; leather; south; spell; west*
covered	*dust; ivy; moss; snow; vine*
driven	*chauffeur; motor; power; steam; wind*
filled	*gas; smoke; sun; tear; water*
laden	*moisture; snow*
lined	*fur; head; tree; stream*
minded	*air; budget; economy; sports*
related	*age; church; drug; health; work*
stained	*blood; clay; tear; travel; weather*
stricken	*grief; horror; panic; poverty; terror*

Table 13.
Most frequent NPs and Pps as [NP–Pp] compounds in the COHA.

The dataset for the analysis thus comprises all the frequencies of NPs and Pps from the first and the second columns in Table 13 occurring either as NP–Pp compounds or as more compositional periphrastic expressions. What follows is a distinctive collexeme analysis (DCA) (cf. Gries & Hilpert 2008) measuring the competition of the entrenchment of [NP–Pp] compounds versus RC attempts to use the same words in a periphrastic and discursive way. DCA is often used to compare the distinctive attraction among two (or more) competitive lexemes (or collexemes) with a construction (or collostruct) in different periods of time. In this case, the same collexeme type Pp (e.g. *based, stained*) is studied based on attraction to the [NP–Pp] collostruct (e.g. [*New York-based*], [*Atlanta-based*], [*blood-stained*], [*tear-stained*]) whilst competing with more compositional strategies where the NP acts as a separate argument (e.g. *based in a studio in New York, based in Atlanta; stained with red blood, stained with tears*). Positive values indicate a preference for entrenched NP–Pps compounds, while negative ones show a distinctive attraction between Pps and NPs acting as separate arguments. The results of this model are plotted in Figure 9.

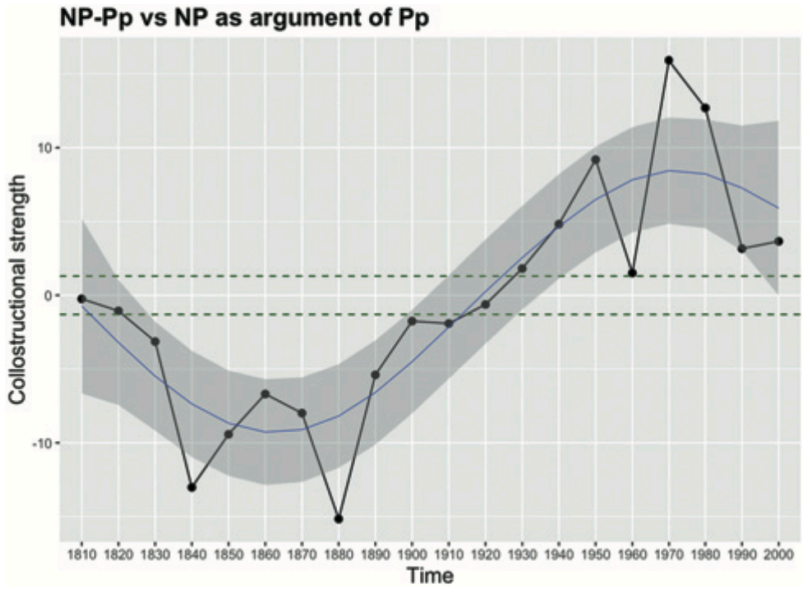

Figure 9.
Distinctive collexeme analysis of NP–Pps competing with NPs as arguments of Pps.
(Tantucci & Di Cristofaro 2020: 15)

The Figure shows that the collostructional attraction between Pps and NP–Pp compounds increases over time. In fact, a process of chunking of NP–Pps becomes significant after 1930, as all the remaining observations up to 2000 are above the upper green line at the level of 1.3 o the y axis. The latter corresponds to the minus log10 of 0.05 and can be used as a cut-off point to identify significant collostructional attraction (>1.3). On the other hand, negative values (<1.3) indicate a significant preference for the competing option, which in this model is when NPs occur as a separate argument of Pps. The plot shows that before the beginning of the twentieth century, there is a distinctive attraction of Pps to construct where NPs operate as separate arguments. This is because the compound became frequently used only during the 20th century, after which the [NP-Pp] compound is preferred to periphrastic alternatives. All in all, the plot confirms what would be predicted in a classic usage-based framework, showing that since 1930 up to the present, a clear

process of entrenchment and automatised behaviour towards the use of NP–Pps is distinctively at work.

That being said, it is worth noting a drop in the speakers' preference for NP–Pps since 1970, with the last two decades barely touching the green line of significance level. This tendency becomes more evident after isolating the time span since one decade before NP–Pp significantly becomes the preferred option:

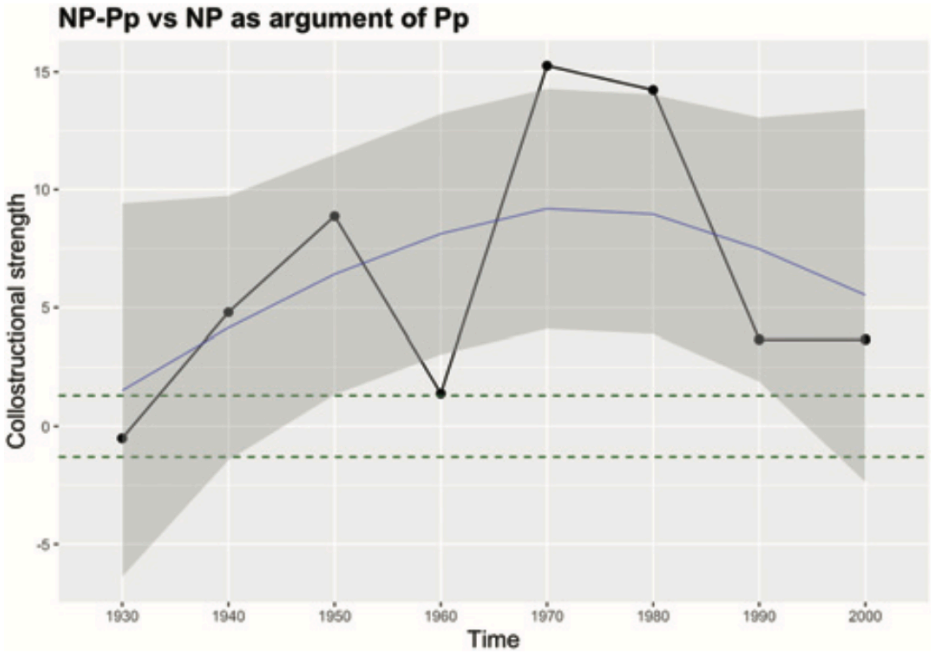

Figure 10.
NP–Pps competing with RC from 1930 up to 2000
(Tantucci & Di Cristofaro 2020: 16)

What Figure 10 shows is remarkable in that the increased entrenchment of a newly formed compound is often expected to be exponential and, in most cases, unidirectional (e.g. Bybee et al. 1994; Hopper & Traugott 2003; Traugott & Trousdale 2013). However, speakers after 1970 increasingly refer to the same internal constituents of newly chunked compounds (e.g. [*tree-lined*]) periphrastically (*lined on both sides with immense trees*), thus statistically inhibiting the entrenchment of the NP–Pp construct and contributing to "drag down" its collostructional strength from 15.26 to 3.66. This is a clear indicator of a process of large scale RC competing with automatised behaviour, and somewhat 'fighting against' the constructional change of the [NP–Pp] compound.

A way to demonstrate this is with the "HoltWinters" (e.g. Chatfield 1978) function of the ARIMA model for time series from the R "forecast" package to retrospectively predict the change of NP–Pp compounds during the last 50 years of change, based on their history from 1810 up to 1950. The prediction can be made based on per-milion-word frequency (therefore not including RC as a competitor of change) or based on collostructional strength (thus controlling for RC as an inhibitor of change). The two predictions are plotted in Figure 11:

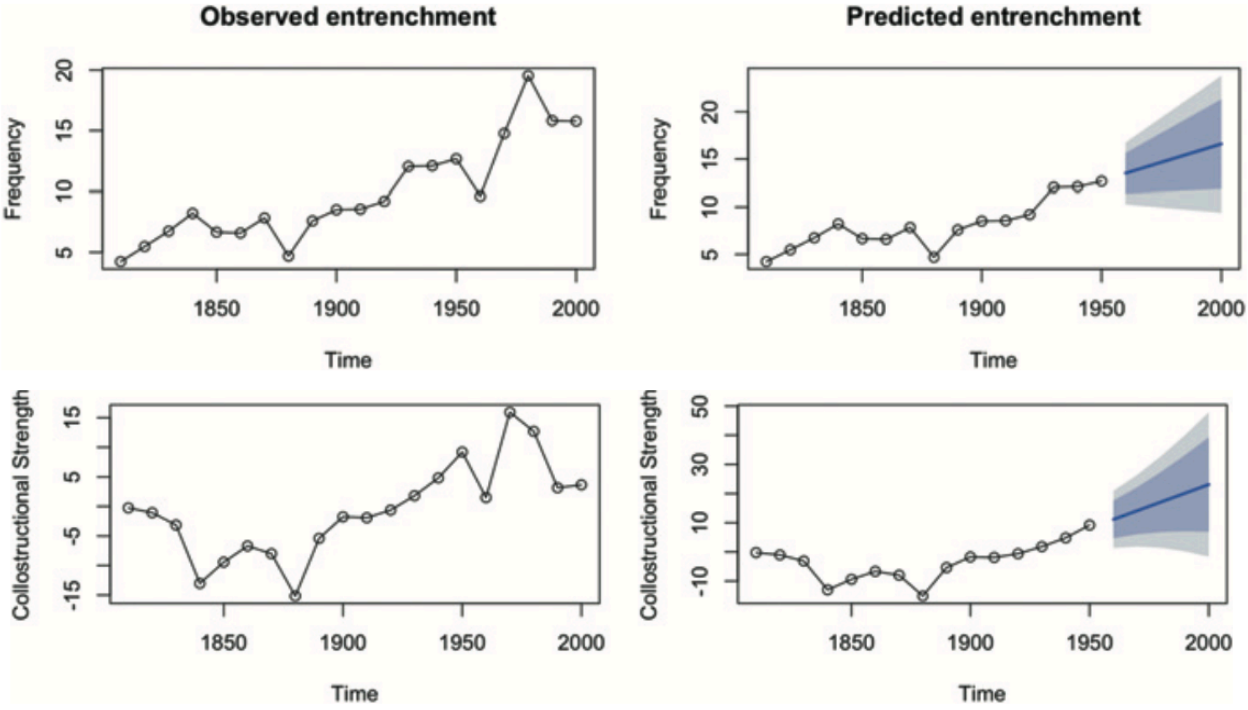

Figure 11.
Observed versus predicted entrenchment of NP–Pps based on frequency vs collostructional strength

The Figure shows that the model does a very good job at predicting the frequency of [NP–Pp] compounds alone by the year 2000 (in the first row, values on the left and the right are respectively 16.59 and 15.77). However, when RC is also taken into account as a competitor of the usage of [NP–Pp], the unidirectional line of predicted change is very different to what actually happened. In fact, the predicted collostructional attraction of Nps to the compound vs periphrastic strategies is 23.10, while the actual value is 3.65 (see second row of plots in Figure 11). The reason for such a remarkable mismatch is that RC acts as a competing mechanism of entrenchment during the second part of the 20th century, which is something that the model cannot foresee. Simply put, speakers did not incrementally opt for a reduced and automatised way to express the meaning of [NP–Pp], but eventually started to use more compositional, creative and periphrastic strategies to express similar meanings. Even more importantly, after the rise of the new [Np-Pp] compound in American English, speakers adopted novel RC strategies involving words that would not collocate prior to the formation of the compound, such as *shaped in the form of a U*, out of the [Np-Pp] *U-shaped* (COHA – William L. Lawrence/Dawn Over Zero/1946) or *They faced each other without shame* out of the [Np-Pp] *shame-faced* (COHA – Short Stories of Various Types/1920).

It is important to note that RC can also intersect with dialogic resonance diachronically. In Tantucci et al. (2018) is provided a DCA about the dialogic constructionalisation of the pair [A: *good morrow* B | B: *(good) morrow* (A)] from the fifteenth to the eighteenth century. After reaching the highest degree of entrenchment, automatisation and schematicity, the dialogic pair is subject to a process of recomposition of its internal constituents, as speakers eventually start to opt for increasingly compositional strategies to perform the greeting. Importantly, the chapter will also include an in-depth qualitative analysis of the contextual and stylistic factors that may determine the new rise of periphrastic strategies.

To conclude, the chapter shows how RC is a key mechanism in language change. On the one hand it may trigger innovation and subsequent conventionalisation of a new variation of a construction. On the other – and this is the case of the present case study – it may act as a counterbalancing force to routinisation and entrenchment of verbal behaviour.

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