

ERC Advanced Grant 2023
Research proposal [Part B1]

Universal Paradigmatic Gaps

UNPAG

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Project duration: 60 months

Universal paradigmatic gaps are gaps in linguistic paradigms that appear across languages and across users of a given language. As of yet, only very few gaps of this kind have been discussed in the literature. The one gap that has received substantial discussion concerns the universal absence of a lexicalized negated form for the quantifiers *all*, *every* or *always*: There appears to be no language in the world that exhibits a single word (or lexical item) that means ‘not all’, ‘not every’ or ‘not always’, an observation dating back to Thomas Aquinas (1225-1274). **UNPAG will show that the landscape of *universal paradigmatic gaps* is in fact much richer and more varied than generally imagined.**

It is deeply enigmatic that such words do not exist across languages and cultures. Clearly, any theory seeking to explain such missing lexicalizations, i.e. any theory of universal paradigmatic gaps, should be able to make clear predictions about what may or may not be lexicalized, and why that is the case. Such a theory has thus far not been developed. It is also without question that such a theory should have a broad empirical foundation. To date, the pool of data has been heavily slanted toward well-studied, Western, Indo-European, adult spoken language, and negative quantifiers therein. No existing study has thus far come even close to targeting a richer empirical base, even though many more universal gaps can be observed! **UNPAG will be the long-overdue filler of this gap.**

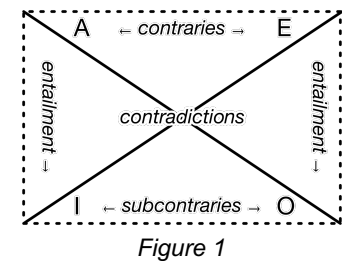
Understanding the nature, distribution and behaviour of *universal paradigmatic gaps* will have several profound implications for our understanding of human cognition, language and communication. UNPAG is the first panoramic study of *universal paradigmatic gaps*. **Why is it that we cannot always say what is thinkable?** UNPAG will provide an answer to this question and show when, how and why universal paradigmatic gaps may emerge in the languages that we speak or sign.

1. Universal Paradigmatic Gaps

Universal paradigmatic gaps are gaps in linguistic paradigms that appear **across languages** and **across users of a given language**. For instance, there appears to be no language in the world that exhibits a single word (or lexical item) that means ‘not all’, ‘not every’ or ‘not always’. In fact, a simple Google search will reveal that the occurrence of non-lexicalized *not all* is highly abundant (more than a billion occurrences on April 2, 2023). **So, why is it the case that no language in the world appears to have a single word for ‘not all’, ‘not every’ or ‘not always’?** Is it really a universal ban or rather a cross-linguistic rarity? Does it only hold only for quantifiers like ‘not all’, ‘not ever’ and ‘not always’, or also for modal quantifiers, i.e. quantifiers over possible worlds? Does it hold equally for spoken and sign languages? And are there more universal paradigmatic gaps like this that have yet to be observed? **These are questions that to date have hardly been addressed in the literature, but have strong implications for our understanding of human cognition, language and communication. UNPAG will address these questions and will show that the landscape of universal paradigmatic gaps is much richer than generally imagined, and that certain alleged universal paradigmatic gaps do not exist despite prima facie evidence to the contrary.**

Horn (1972, 1989, 2012 a.o.) famously observed that the absence of a word like *nall*, meaning ‘not all’, an observation dating back to Thomas Aquinas (1225-1274), is part of a broader systematic absence of words with a particular logical footprint (see also Barwise & Cooper 1981, von Stechow & Matthewson 2008). This is demonstrated by Boethius’ (480-525) renowned *Square of Oppositions* (SoO, Fig. 1). The SoO is a visualization that depicts the four major types of propositions under Aristotelian logic: universal affirmatives (A), existential affirmatives (I), universal negatives (E), and existential negatives (O), each of them illustrated below (the abbreviations correspond to the Latin *Affirmo* (‘I assert’) and *nEgO* (‘I deny’), and their logical relations). For instance, (1a) and (1d) are contradictions; (1a) and (1c) are contraries.

- (1) a. Universal affirmative (A): *every car is red*
 b. Existential affirmative (I): *some car is red*
 c. Universal negative (E): *no car is red*
 d. Existential negative (O): *not every car is red*



Apart from quantifiers, many other logical elements stand in such relations. For instance, the connective *and* (A) entails *or* (I) and is a contrary of *nor* (E) which contradicts *or* (I) again. The same holds for *both* (A), which stands in similar relations to *one* (I) and *none* (E). Strikingly, the O-corners appear never to be lexicalized, neither in English nor in any other language we know of: words like *noth* (meaning ‘not both’) or *nand* (meaning ‘not and’) are likewise never found. The so-called *nall problem* thus concerns the universal, systematic absence of the lexicalization of the O-corner in the SoO, and not just the absence of particular logical operators. **However, I will show that these are not the only universal paradigmatic gaps that can be attested and require explanation and study; UNPAG will reveal several others.**

2. Scientific significance: Cognition, communication or ...?

2.1 Cognitive approaches

Various accounts for this *nall* problem have been provided. Going back to Jespersen (1917, 1924) and Löbner (1987, 1990), one branch of analyses (Jaspers 2005, Seuren 2006, Larson & Jaspers 2011, Seuren & Jaspers 2014) argues that although the SoO contains four corners, cognitively, there are only three prime oppositions (between A, I, and E), with approaches differing whether the E-corner reflects an operator *some and possibly all* or *some but not all*. If indeed the core oppositions only involve A, I and E, and not O, the absence of lexicalizations of O could receive a direct cognitive explanation: if cognitively, there is only a *Triangle of Oppositions*, there is no question then as to why the missing corner is never lexicalized. Sbardolini (2023) takes such triangles as the basis of his *Logic of Lexical Connectives* (see also Incurvati & Sbardolini 2023). However, as Jaspers (2005) acknowledges, even if the O-corner is not a prime cognitive concept, the question remains open why logically conceivable complex meanings, such as ‘not all’, ‘not both’, or ‘not and’ still cannot be lexicalized at all. Again, this point becomes especially relevant in the light of the aforementioned observation that the complex construction ‘not ... every’ is in fact highly pervasive (see also Hoeksema 1999).

More recently, Seuren & Jaspers (2014) argue that the SoO is actually best replaced by a hexagon (after Jacoby 1950, 1960, Sesmat 1951, Blanché 1952, 1953, 1966), which comprises all logical relations between A, I, E and O, and two other ones: Y ($\equiv I \wedge \neg A$, *some but not all*) and U ($\equiv A \vee \neg I$, *all or nothing*). Of the six corners of this hexagon, they argue, U and O are never realized. The corners that form a kite are the only candidates for lexicalization (see Fig. 2). Note that, Seuren (2013) and Seuren & Jaspers (2014) take both Y and I to be realized by the same lexical item *some*; in fact, they argue that every realization of the I-corner is systematically homophonous with that of the Y corner, without providing a reason why this is the case.

The reason why U and O are never realized, for them, is that they take lexicalized logical operators to be restrictors of a universe. The primary means of restricting a universe, they argue, is that between E (*no*) and I (*some or all*); the secondary means is the subdivision of I between A (*all*) and Y (*some but not all*). This way, neither O nor U can be used as further restrictor and are therefore never realized. However, these are not the only possible restrictions that could conceivably be made. One could equally well first divide a universe between A and O, and have O further be subdivided between E and I. It is unclear why these restrictions could not then be lexicalized to the exclusion of Y and U. Seuren & Jaspers (2014) here follow Jaspers (2005) and Larson & Jaspers (2011) in assuming that the distinction between E and I is ‘pivotal’. Again, by assigning exceptional cognitive status to E and I over A and O, the absence of O-lexicalizations could be accounted for, but it is not clear why E and I must be cognitively more primitive. Indeed, the fact many languages lack an E realization as well (e.g. Hindi, see Zeijlstra 2022) casts considerable doubt on this.

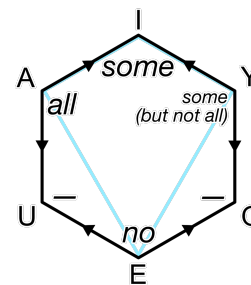


Figure 2

Moreover, the observation that natural languages never exhibit a single word for U can already be independently explained in terms of connectedness. As Chemla et al. (2019) have shown, connectedness is a necessary condition for both content and function words. We thus do not find words meaning ‘bottle or eagle’ or ‘less than five or more than 10’. A single word meaning ‘all or nothing’ would violate connectedness, as the intermediate ‘some’ cannot be expressed by it.

2.2 Communicative approaches

An alternative approach has been built upon the notion of efficient communication, and, more explicitly, pragmatic blocking. In short, the existence of a lexicalization for the I-corner blocks lexicalization for the O-corner. This approach has originally been put forward by Horn (1972, 1989, 2012) and has recently been reimplemented by Katzir (2007), Katzir & Singh (2013), Uegaki (2022), Enguehard & Spector (2021), Züfle & Katzir (2022) and Bar-Lev & Katzir (2022) in different ways. Their main argument, in short, is that, while I- and O-type sentences are semantically different, their pragmatic contributions are in fact similar. To see this, let us take into consideration the joint meaning contributions of the following two examples:

- | | | | | | | |
|-----|----|--------------------|-------------------------------|----|---------------------|-------------------------------|
| (2) | a. | Assertion | Some car is red | b. | Assertion. | Not every car is red |
| | | <u>Implicature</u> | <u>Not every car is read</u> | | <u>Implicature.</u> | <u>Some car is read</u> |
| | | Joint meaning: | Some but not every car is red | | Joint meaning: | Some but not every car is red |

Since the joint meaning contributions made by the corresponding I- and O-type sentences are the same, natural language only needs to exploit one. This way, only three out of the four lexical corners need to be lexicalized in order to convey the overall meanings of all four corners. The reason, then, that it is O (and not I) that never gets lexicalized has to do with markedness. Because Horn takes negative expressions to be always marked in comparison to their positive counterparts, the possible existence of I-type terms blocks the existence of O-type terms (though see Enguehard & Spector 2021 and Bar-Lev & Katzir 2022 who aim to derive this effect in independent terms). In short, if a language is to lexicalize either the I- or the O-corner, it must be the I-corner.

As Hoeksema (1999) points out though, pragmatic equivalence is by nature much weaker than semantic equivalence. One can easily utter the assertion in (2a) about a particular subset of cars without knowing anything about the colours of the other cars, but the pragmatic equivalence of (2) and (2) is then already disrupted. Moreover, if conveying I-type sentences blocks conveying O-type sentences, the question emerges why utterances containing expressions like ‘not ... every’ or ‘not ... all’ are nevertheless allowed and fully interpretable; as mentioned previously, their appearance is abundant. Hence, this approach is, in one way, too weak (pragmatic equivalence is too weak to account for such blocking), and, in another, too strong (it predicts the exclusion not only of O-lexicalization, but also that of O-type sentences generally).

2.3 Or ...

All approaches so have presented arguments why lexicalizations like *nall* and *nand* should be grammatically or lexically ruled out. However, **novel evidence** is available that shows that such lexicalizations can be observed **both inside and outside the domain of negated quantifiers**. This shows that what is still needed is a proper theory of when certain logical operators can be lexicalized or not. It is without question that any theory of such missing lexicalizations, i.e. any theory of universal paradigmatic gaps, should make clear predictions about what may or may not be lexicalized, and why that is the case. **Such a theory thus far not been developed.** It is equally without question that a theory should have a profound empirical basis, whereas currently, the pool of data has been heavily slanted toward well-studied, Western, Indo-European, adult spoken language, and negative quantifiers therein. **No existing study has thus far come even close to targeting a richer empirical base, even though many more universal gaps can be observed! UNPAG will be the long-overdue filler of this gap.**

3. Universal Paradigmatic Gaps: Extending the landscape

3.1 Extending the NALL problem

It has been received wisdom for a long time that languages systematically lack realizations of the O-corner. But while there is a clear pattern, whether such a claim is really cross-linguistically sound has never been investigated. No typological study has been devoted to it, and there may be reasons to doubt that lexicalized O-terms are universally absent. As Seuren & Jaspers (2014) have pointed out, data from Kinyarwanda may actually falsify it; Kinyarwanda has a series of expressions like *sibose* or *sihose* that appear to mean ‘not all people’ or ‘not everywhere’, respectively, though it is unclear whether they mean just that or rather ‘some but not all people’ or ‘somewhere but not everywhere’.

In addition, Kuhn & Pasalskaya (2023) have shown that examples in the domain of modals O-lexicalizations can be regularly attested, arguing against esp. Enguehard & Spector (2021). Bimorphemic *unnecessary* is a good example, as is, they claim, monomorphemic *optional*. However, unlike *unnecessary*, *optional* may strongly infer possibility, rendering it not a true O-lexicalization: *it is unnecessary; in fact it is even forbidden*, is perfectly acceptable, whereas *it is optional; in fact it is even forbidden* sounds unnatural. This may suggest that simplex words with an O-meaning still cannot be attested, even among modals. However, Kuhn & Pasalskaya (2023) demonstrate that in certain sign languages, such monomorphemic O-lexicalizations can nevertheless be found; E.g., French Sign Language has a simplex sign for *unnecessary*.

Lin et al. (2015, 2018) have also shown using corpus studies and experiments that in the first stages of languages acquisition (2;0-3;10), the Dutch modal verbal stem *hoef* (‘need’) is always used as a fixed expression with the negative marker *niet* (like *hoefnie(t)*). As Lin et al. demonstrate, children first take this to be a lexical construct prior to determining that this verb can also appear in other constructions. Consequently, this lexical expression *hoefnie* also qualifies as an O-lexicalization.

This shows that O-lexicalizations indeed are not systematically ruled out. Naturally, this claim will have to be further substantiated typologically and experimentally. Moreover, it will need to be investigated what restrictions O-lexicalizations (modal vs non-modal, sign language vs spoken language, etc.) are subject to and why. UNPAG will carry out these investigations.

3.2 Lexicalization constraints in the domain of Polarity-Sensitive Items

Similar gaps on lexicalizations can be attested among Polarity-Sensitive Items (PSIs), at least those PSIs that quantify over individuals or time variables. PSI come about in two types. One is called a Positive Polarity Item (PPI), as it is restricted to positive contexts; the other is called a Negative Polarity Item (NPI), as it is restricted to negative contexts. As an example, English *any*, a realization of I, is an NPI as it can only appear in sentences that in one way or another count as negative (see Ladusaw 1979, Giannakidou 1999 among any others): **She ate any cookies* is an unacceptable sentence in English, but *She didn't eat any cookies* isn't. The mirror image of *any* is *some*, another I-term. *Some*, by contrast, is a PPI can only appear in positive environments. To the extent that *She didn't eat some cookies* is an acceptable sentence, it is only acceptable under the reading that there are some cookies that she failed to eat, and not that she ate no cookies.

However, while PSIs are not restricted to low scalar endpoints (like all I-terms), no PSI that is an A-term has been attested among quantifiers over individuals or time variables. Put differently, while higher scalar expressions like *much* (NPI) or *rather* (PPI) can indeed be attested (see Israel 1996), no language in the world so far has been identified as having a word like *every* that is an NPI or a PPI. That is, there is no language with an expression X meaning ‘every’ that is allowed only in negative contexts or only in positive contexts.

For modals, the empirical landscape is fundamentally different. In the domain of deontic modals—modals expressing obligation and permission—the facts seem to be reversed. English universal modal A-terms *must* and *should*, for instance, are uncontroversially taken to be PPIs (see Israel 1996, Iatridou & Zeijlstra 2013, Homer 2015), which explains why *Alex mustn't/shouldn't leave* means that it must/should be the case that she does not leave (note that word order does not determine such scopal relations; *Alex hasn't (got) to leave* means that it is not the case that she has to leave). Similarly, universal A-modals like English *need*, Dutch *hoeven* (‘to need’) or German *brauchen* (‘to need’), when taking a verbal complement, are well-known NPIs. However, in the domain of deontic modality, existential NPIs or PPIs crucially are not attested. There is no known existential PPI meaning *may* and there are only very few, if any, existential NPIs (see Van der Auwera 2001, Meijer 2014, Zeijlstra 2022 for discussion of some possible examples). And finally, among epistemic modals—modals concerning knowledge and beliefs—all six types can be found. Existential PPIs (*may* as in *She may (not) be in her office*), existential NPIs (*can* as in *She can't/*can be in her office*), Universal PPIs (*should* as in *She should (not) be in her office*) and Universal NPIs (*need* as in *She need*(n't) be in her office*). In addition, both existential and universal polarity-insensitive elements can be found, such as *could* or *has to*.

This demonstrates that for PSIs, in certain domains (quantification over individuals or time variables) no clear O-like terms (here, universal PSIs) can be attested. However, in other domains (quantification over possible worlds or situations), either O-like, but not E-like PSIs can be attested (as in the case of deontic modals), or both may be (as in the case of epistemic modals). These data necessitate systematic inquiry into

the degree to which these empirical generalizations about PSIs are consistent with cross-linguistic data, and into whether such absent PSIs are grammatically impossible. Such an investigation will also be conducted under UNPAG.

3.3 Weak vs strong modals and Neg-Raising

Traditionally, universal modals have been divided into two categories: strong necessity and weak necessity modals. This categorization targets the observation that strong necessity modals (such as *must* or *have to*) are semantically stronger than weak necessity modals (such as *should* or *ought to*), as the following examples show: *You should leave but you don't have to* is acceptable, while *#You have to leave but you shouldn't* is much odder. However, despite morphological similarities, modals like *might* or *could* do not stand in a similar strength relation to *may* or *can*: *#You could/might leave but you can't / may not* sounds contradictory. Mirrazi & Zeijlstra (2023), building upon work by von Stechow & Iatridou (2008), show that *might/could* behave as existential duals of strong necessity modals and tend to yield strong possibility readings. English thus appears to lack weak possibility modals. In other words, there may be both strong and weak modal A-terms, but weak modal I-terms never appear to be lexicalized. This is not a coincidence; hardly any language lexically exhibits weak possibility modals (though see Mocnik 2018 for a potential exception in Slovenian).

The absence of weak modal I-terms at first glance seems related to the fact that weak necessity modals, when negated, can give rise to so-called Neg-Raising (NR) readings, while strong necessity modals cannot. Though both *must* and *should*, being PPIs, generally outscope negation, when embedded under a negated NR predicate, *should* is able to outscope matrix negation, whereas *must* is not:

- (3) a. I don't think that John should marry Susan. (✓ *should* > not)
 b. I don't think that John must marry Susan. (*#must* > not) (Homer 2015)

This shows that *should* is an NR predicate but *must* is not. Similar observations can be made for other strong and weak necessity modals: weak necessity modals are always Neg-Raisers, strong necessity and possibility modals never are. The latter is unsurprising, as it has been known since Horn (1989) that NR predicates are high scalar elements. However, no fundamental explanation as to why strong necessity modals are not Neg-Raisers and weak necessity modals are is currently available (though see Mirrazi & Zeijlstra 2023 for some hypotheses). Naturally, UNPAG will also evaluate these paradigmatic gaps.

4. Research Questions & Hypotheses

4.1 Research Questions

UNPAG will address the following **Research Questions**:

RQ1: What kind of universal paradigmatic gaps can be attested with respect to the lexicalization of logical elements in natural language?

RQ1a: What kind of universal paradigmatic gaps can be attested with respect to the lexicalization of negative and positive quantifiers over individuals and over possible worlds in natural language?

RQ1b: What kind of universal paradigmatic gaps can be attested with respect to the lexicalization of polarity-sensitive quantifiers over individuals and over possible worlds in natural language?

RQ1c: What kind of universal paradigmatic gaps can be attested with respect to the lexicalization of weak and strong quantifiers over possible worlds in natural language and the way they interact with Neg-Raising?

RQ2: What determines the landscape of lexicalized logical elements in natural language?

RQ2a: To what extent are the attested absent lexicalizations universal, as opposed to simply being cross-linguistically rare?

RQ2b: To what extent are the attested lexicalization constraints sensitive to the modality of a language (spoken languages vs. sign languages)?

RQ2c: To what extent are the attested lexicalization constraints sensitive to the nature of the domain of quantification (quantification over individuals/time variables vs. quantifiers over possible worlds)?

RQ2d: To what extent are the apparently absent lexicalizations still learnable?

RQ3: How can the landscape of lexicalized logical elements in natural language be explained?

RQ3a: What explains the existence of the observed constraints on the lexicalization of logical elements?

RQ3b: Why do lexicalization constraints in the domain of quantifiers over individuals / time variables appear to apply primarily to universal elements?

RQ3c: Why do lexicalization constraints in the domain of quantifiers over possible worlds appear to apply primarily to existential elements (if at all)?

RQ3d: Why are lexicalization constraints sensitive to modulation?

4.2 Hypotheses

Given the above, the general hypothesis is that unlike all existing approaches concerning universal paradigmatic gaps with respect to the lexicalization of logical elements in natural language, such gaps are not universally ruled out in natural languages. Rather, when closely investigating what constitutes such universal gaps, it is revealed that such lexical elements either have a meaning that appears to be very weak, or have

semantic properties that make them far more opaque than the existing lexicalizations. Since elements with very weak meanings and elements with very opaque properties are very hard to learn, **they are universally rare but can be attested**.

General Hypothesis (H): Universal paradigmatic gaps are not ruled out by the grammar. They are only much harder to identify.

H1: Absent O-lexicalizations are rare, as processes of lexicalizations where a negative marker and another scalar element melt together into one word only target unfocused elements. As the meaning of unfocused negated universal quantifiers is much weaker than those of focused ones, such unfocused negated universal quantifiers are less likely to emerge as candidates for lexicalizations. When lexicalization works in a different fashion (e.g. in sign languages or in the acquisition of negative modals), O-lexicalizations can be more readily attested (Zeijlstra 2022).

H2: In order to understand constraints on the lexicalization of polarity-sensitive elements, one needs to first understand what renders some element an NPI or a PPI. Assigning these properties to other quantificational elements does not naturally result in run-of-the-mill PSIs (Zeijlstra 2017, 2022).

H2a: Assigning the properties that Chierchia (2013) attributes to existential NPIs to universal quantifiers does not yield universal PPIs but rather universal quantifiers that can appear below negation but cannot reconstruct below it. Such elements can be attested.

H2b: Assigning the properties that Zeijlstra (2022) attributes to existential PPIs to universal quantifiers does not yield universal NPIs, but rather universal quantifiers that can appear in non-negative clauses but must reconstruct below a clausemate negation when present. Such elements can also be attested.

H3: The difference between weak and strong necessity modals is that the latter have to have the actual world in their domain of quantification, but the former do not (Silk 2016, 2022).

H3a: Existential modals that do not have to make references to the actual world have a meaning that is so weak that these either are not lexicalized, or when they are, are obligatorily strengthened in most positive contexts (see Mirrazi & Zeijlstra 2021).

H3b: Modals that make reference to the actual worlds can never undergo strengthening (neither in negative nor in positive contexts). Strong necessity modals can therefore never trigger Neg-Raising effects, while weak necessity modals can (see Mirrazi & Zeijlstra 2021, 2023).

5. Setting up the project

The project consists of 4 pillars, each exploring one type of lexicalization constraint. Pillar 1 examines negated universal quantifiers and investigates the predictions made by **H1**; Pillar 2 examines existential NPIs and universal quantifier PPIs and investigates the predictions made by **H2a**; Pillar 3 examines existential PPIs and universal quantifier NPIs and investigates the predictions made by **H2b**; Pillar 4 explores the differences between weak and strong modals and the effect they have on triggering Neg-Raising readings, and investigates the predictions made by **H3a-b**. Each PhD student will work on one of the Pillars, focusing on **RQ1a-c**.

Apart from studying the intricacies of each phenomenon within the respective Pillars, all phenomena will also be approached “horizontally” along two axes: a cross-linguistic and an experimental axis. Cross-linguistically, the investigation will follow the method of language sampling, based on Rijkhoff et al. (1993) and Rijkhoff & Bakker (1998), and along the lines of Baker (2010). It will delineate the exact landscape of universal paradigmatic gaps with respect to the lexicalization of logical elements in natural language, and how this landscape is sensitive to the domain of quantification and the choice of modality. Experimentally, it will implement the method of artificial language learning (see a.o. Culbertson 2012, 2023, Culbertson and Adger 2014, Martin et al. 2019, 2020, Chemla et al. 2019) to discern first whether lexicalized negative universal quantifiers and weak possibility modals can still be acquired by language learners (Pillars 1 and 4), and second, whether plain universal NPIs and PPIs, unlike those with the special reconstruction possibilities, cannot be acquired (Pillars 2 and 3). One 4-year postdoc will be responsible for the cross-linguistic angle (incl. sign languages); another 4-year postdoc will be responsible for the experiments. These postdocs will jointly address **RQ2a-d**.

The overall theoretical analysis will be developed under the oversight of the PI and the 5-year postdoc, in full collaboration with the other postdocs and the PhD students. They will develop a full theoretical account of how and why certain cells in a given paradigm are so weak or opaque that they give rise to the impression that they are universally absent. This part of the project addresses **RQ3a-d**.

The overall project consists thus of $3 \times 4 = 12$ Subprojects (SPs). Within each SP, project members intensively collaborate, but will also be part of an Axis or Pillar for which one project member is the main investigator. Team members thus share responsibility for subprojects, but simultaneously maintain a fair level of independence. This ensures a high likelihood of success for the project, and also fosters a stimulating work environment, while at the same time leaving room for team members to build their own careers by taking primary responsibility over parts of the project.

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