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Kin Cognition and Communication: What Talking, Gesturing, and Drawing About Family Can Tell us About the Way We Think About This Core Social Structure

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Abstract

When people talk about kinship systems, they often use co-speech gestures and other representations to elaborate. This paper investigates such *polysemiotic* (spoken, gestured, and drawn) descriptions of kinship relations, to see if they display recurring patterns of conventionalization that capture specific social structures. We present an exploratory hypothesis-generating study of descriptions produced by a lesser-known ethnolinguistic community to the cognitive sciences: the Paamese people of Vanuatu. Forty Paamese speakers were asked to talk about their family in semi-guided kinship interviews. Analyses of the speech, gesture, and drawings produced during these interviews revealed that lineality (i.e., mother's side vs. father's side) is lateralized in the speaker's gesture space. In other words, kinship members of the speaker's matriline are placed on the left side of the speaker's body and those of the patriline are placed on their right side, when they are mentioned in speech. Moreover, we find that the gesture produced by Paamese participants during verbal descriptions of marital relations are performed significantly more often on two diagonal directions of the sagittal axis. We show that these diagonals

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are also found in the few diagrams that participants drew on the ground to augment their verbo-gestural descriptions of marriage practices with drawing. We interpret this behavior as evidence of a spatial template, which Paamese speakers activate to think and communicate about family relations. We therefore argue that extending investigations of kinship structures beyond kinship terminologies alone can unveil additional key factors that shape kinship cognition and communication and hereby provide further insights into the diversity of social structures.

Keywords: Kinship typology; Gesture; Relational thinking; Spatial thinking; Perspective taking; Spatial semantics; Multimodality

1. Introduction

1.1. Thinking and speaking about kinship

How people acquire the foundations of kinship categorization has been investigated since Piaget (1926/1997) identified a number of developmental stages at which children are able to gradually understand that a kinterm refers to a category of person and can take a relational perspective (X is Y's brother) and a reciprocal perspective (if X is Y's brother, then Y is X's sister). Later studies (e.g., Danziger, 1957; Greenfield & Childs, 1977; Haviland & Clark, 1974) proposed alternative or additional stages, and more recent studies have also shown that infants can reason about third-party relationships (Jin, Houston, Baillargeon, Groh, & Roisman, 2018) and are able to triangulate social relations between third parties in contexts of caregiving (Spokes & Spelke, 2017). Although the ontogeny of kinship literature does not always agree on the methods to employ, the number of developmental stages, and the age at which they are acquired, research aligns on the fact that thinking and communicating about kinship is a complex cognitive process that involves a combination of perspective taking (or viewpoint) and relational reasoning (Blythe, Tunmuck, Mitchell, & Rącz, 2020; Mitchell & Jordan, 2021). The meaning of the English term *cousin*, for example, is understood through a combination of relational concepts (Child, Parent, Sibling) and perspective-shifting (Ego → Ego's Parent → Ego's Parent's Sibling → Ego's Parent's Sibling's Child → Ego's Parent's Sibling's Child = *my cousin*). Learning not only to think but also to communicate about family relations involves semiosis, that is, the pairing of a concept with an expression. When English children acquire the concept "brother" and map its meaning onto the string of phonemes /brʌðər/, they acquire a convention of the English lexicon: The sign *brother*, which, once conventionalized, fits into a larger system of relations that is called a kinship terminological system.

1.2. Kinship terminological systems as a window into the world's social structures

Kinship terminological systems display a great diversity of structure across the world's ethnolinguistic communities. For instance, the English kinship system distinguishes between brothers and male cousins, whereas the Hawaiian terms for a brother and a male cousin are the same. However, the term for brother in English is not relative to Ego's sex, in contrast to the Hawaiian terminology, which marks ego's sex (e.g., *kaikuane* is a brother

of female ego and *kaikua'ana* is a same-sex sibling). A list of eight such “parameters” (e.g., linguistically marking the difference between a “brother” and a “cousin”) has first been identified by Kroeber (1909, pp. 78–79):

1. The difference between persons of the same and of separate generations.
2. The difference between lineal and collateral relationship.
3. Difference of age within one generation.
4. The sex of the relative.
5. The sex of the speaker.
6. The sex of the person through whom the relationship exists.
7. The distinction of blood relatives from connections by marriage.
8. The condition of life of the person through whom the relationship exists.

Murdock (1947, 1949) proposed to classify all kinship terminological systems of the world into six categories (Crow, Eskimo, Hawaiian, Iroquois, Omaha, Sudanese), which correspond to bundles of features of the kind identified by Kroeber. The 7000+ languages of the world indeed display a great diversity in the categorization of kinship (Kemp & Regier, 2012), in the same way as other universal domains of experience such as light (Berlin & Kay, 1991), body (Devylder, Bracks, Shimotori, & Siahaan, 2020; Enfield, Majid, & Staden, 2006; Huisman, van Hout, & Majid, 2021), motion (Naidu et al., 2018; Talmy, 1991), emotions (Ponsonnet, 2014), and smell (Majid & Burenhult, 2014). The Murdock typology has been a key instrument in the study of kinship in cultural anthropology, particularly in the extensive literature focusing on the diversity of social structures.

The study of kinship terminologies and social structures is based on the intuition that the structural diversity of kinship terminological systems reflects a diversity of social organizations and practices. This logic entails that by mapping the way people categorize members of their society in language, we can infer the way people structure their society in practice. For example, Murdock (1947, 1949) found correlations between types of kinship systems and rules of marriage, and Goody (1970) observed that kinship systems correlate with the absence or existence of incest taboo between cross-cousins and with types of descent.

However, the explanatory potential of the Murdock typology to investigate potential associations between linguistic and social structures has arguably reached its limits. Because kinship types, by definition, are a bundle of features, and they collapse subtle distinctions that may be important to a given social kinship organization. Indeed, in a large-scale study of 936 societies and their corresponding type of kinship system, Passmore and Jordan (2020) found no universals in the cultural evolution of kinship terminology. The authors conclude that earlier studies were not necessarily mistaken about the relation between social norms and kinship terminologies but rather that their findings reveal the inadequacies of the Murdock typology. The Murdock brush may be too broad for kinship types to correlate with important features of social kinship organization. The Murdock types and their associated bundles of features should be unpacked into a list of parameters. A finer-grained identification of which parameters are marked in kinship terminology, and which are not, would provide finer insights into which aspects of kinship relations hold significance in the cultural context of that language and which do not.

Yet, lists of words, like kinship terminologies, are hardly the only means through which members of a community communicate about kinship, and therefore hardly the only way through which we can identify relevant parameters. Recognizing communication as a complex, multimodal phenomenon, it becomes crucial to broaden our understanding of kinship systems beyond kinship terminology. Extending investigations of kinship structures beyond kinship terminologies alone can potentially unveil additional key factors that shape kinship cognition and communication and hereby provide further insights into the diversity of social structures.

1.3. *Gesture: A window onto a speaker's mind*

Gesture—defined as bodily “actions that have the features of manifest deliberate expressiveness” (Kendon, 2004, p. 15)—has come to be seen as an integral part of communication and cognition (e.g., Kendon, 1972, 1980, 2004; Kita, 2000; McNeill, 1992, 2005; Núñez & Sweetser, 2006; Özyürek, 2014; Perniss, 2018). Many scholars have considered gestures a “window onto the mind” (Goldin-Meadow, 2003; McNeill, 1992) for the way in which they embody (or “exbody”; Mittelberg, 2013) details of a mental construal of an idea or event relayed in speech (cf. Cooperrider & Goldin-Meadow, 2017, for an overview). Gestures here are broadly understood as discourse-embedded, kinesic actions that are performed with the hands and arms, head, shoulders, torso, or entire body, and have semiotic function(s) (Mittelberg & Hinnell, 2023).

In addition to facilitating comprehension for the interlocutor and helping the speaker/gesturer think, co-speech gestures also show how speakers organize their discourse space, creating a spatial map of both concrete and abstract discourse referents. Speakers regularly use the location of their gestures to identify and then refer back to characters in a story (Sekine & Kita, 2015; So, Kita, & Goldin-Meadow, 2009,) and interlocutors use this information as well (Parrill et al., 2022; Sekine & Kita, 2017). These findings suggest that gestures reflect a mental model of discourse entities in short-term memory. Beyond assigning referents to space, gestures can represent relations between objects or concepts. For example, corpus studies of contrastive abstract notions (e.g., Republican vs. Liberal or defense vs. offense) suggest an underlying mental representation of contrast that motivates how speakers map opposing elements on different sides of the lateral axis of the body's gesture space (Hinnell, 2019, 2020; Hinnell & Parrill, 2020).

Given how gesture must always originate from the deictic center of the speaker's body (Bühler, 1982; Parrill, 2009), gestures also facilitate the expression of viewpoint, that is, a speaker/gesturer's perspective on an event they are retelling. Speakers/gesturers can take an “observer” viewpoint, in which they communicate an external, third-person representation, or a “character” viewpoint, in which they represent the event from a first-person perspective (McNeill, 1992; Parrill, 2009; Parrill & Stec, 2018; Stec, 2012).

Studies on the spatialization of abstract concepts have demonstrated that co-speech gestures provide useful insights into how speakers think in ways that are not evident from speech alone. For example, in studies of event encoding, gestures depict nuanced distinctions in event structure that are not marked in speech (Hinnell, 2018; Jehlička & Lehečková, 2020). Woodin,

Winter, Perlman, Littlemore, and Matlock (2020) showed that in gestures that accompanied verbal descriptions of numbers (e.g., huge/tiny number), gesture form, and trajectory (e.g., open vs. closed hand configuration and outward vs. inward movement), as well as space between the hands, reflect the mental construal of such number expressions. Finally, the spatial conceptualization of auditory pitch (e.g., high vs. low pitch) is also revealed in gestures (Holler, Drijvers, Rafiee, & Majid, 2022). The broad conclusion in these studies is that gestures function as an excellent resource for depicting underlying mental conceptualizations and visuo-spatial mental imagery. The spatial affordances of gesture and its role in depicting a speaker's mental conceptualization of kinship structure are at the center of this study of the Paamese Kinship gesture system.

While gestures have been shown to depict mental construals as outlined above, some gesture forms are so common in discourse within a speaker group that they become conventionalized (Bressem & Müller, 2014; Ladewig, 2014; Müller, 2017). *Recurrent gestures* are those that “[r]ecur in different contexts-of-use over different speakers in a particular speech community” (Ladewig, 2014, p. 1559). While frequently associated with pragmatic functions such as the palm-up gestures (Kendon, 2004; Müller, 2004) or the Away family of gestures (Bressem & Müller, 2014, 2017; Bressem, Stein, & Wegener, 2017), recurrent gestures can also serve referential functions, that is, they may depict concrete or abstract features of a referent in the speech utterance. Moreover, if gestures conventionalize both cultural practices and cognitive schemata (Calbris, 2011), they would, on principle, also play an essential role in the transmission of knowledge about one's social structure across generations.

1.4. *Communicating about kinship with speech, sign, and gesture*

Despite the obvious added explanatory potential, only a few studies have, over the past few decades, begun to include gestures in the study of kinship and have identified recurrent gestures overlapping with descriptions of kinship relations that are examples of how this knowledge can be conventionalized and communicated.

In a situation of bereavement, the Thaayorre from the Cape York Peninsula, Australia, have a specific body-part-pointing gesture register, where kinship relations are indicated by pointing to a body part. For example, a point to the shin can be used to refer to an elder brother, any sibling, grandchild, or grandparent of the same patriline as Ego (Gaby, 2016). Gaby found that this sign system displays grouping patterns of kinship relations that are based on three features: patriline, matriline, and generational harmony. Although these three distinctions are culturally significant social structures, they are not marked in the Kuuk Thaayorre kinship lexicon. A description of the Thaayorre kinship system without these gestures would have missed an entire dimension of the way Thaayorre think and communicate about their social structure.

The Kuuk Thaayorre system is one of the many “alternate” sign languages found in Indigenous Australia as described by Kendon (1988). These languages are developed by speakers for use when the use of speech is restricted, for example, due to ritual requirements or a context such as hunting in which one does not want to alert prey. In these languages, and indeed across a wide variety of sign languages, kinship signs have been shown to be body-anchored,

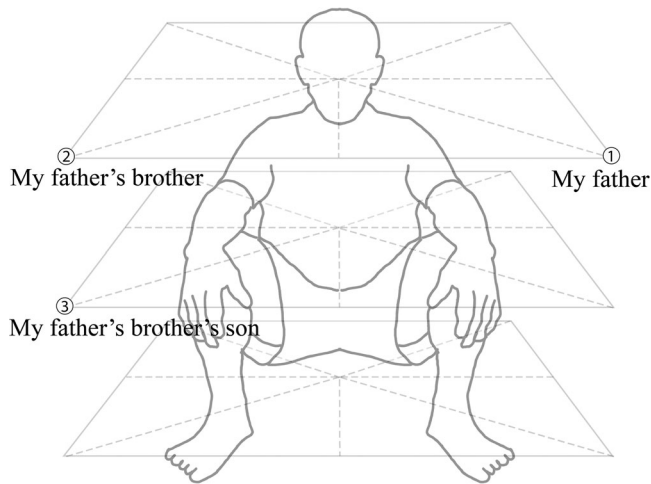


Fig. 1. The spatialization of three kinship relations by a Lao speaker (schematized from Enfield, 2005, p. 57).

that is they point to some part of the body (Kendon, 1988, p. 352; see also Green, Bauer, Gaby, & Ellis, 2018; Wilkinson, 2009). Massone and Johnson (1991) show, for example, that in Argentine Sign Language, or LSA, the signs for father and mother point to the face and chest, respectively, while Wilkinson observed that parental terms are often, but not always, realized on the face across sign languages. Green et al. (2018, p. 27) showed that across the four alternate sign languages they studied, different regional strategies emerge, that is, “individual pairings of body part and kin sign vary,” but they also concur with Kendon’s central observation of the body-anchoring of kinship signs.

Enfield (2005, p. 51) explored gestures of speakers of Lao in Vientiane, Laos, who make “complex spatial representations akin to diagrams” when speaking about their kin in informal conversations and reveal information that is not necessarily retrievable from the accompanying speech utterances. For example, Enfield reports (*ibid*, pp. 57–58) how a Lao speaker describes the way she is related to her first cousin by using verbal and gestural signs through a linear chain of relations. While she explains that she is “the child of [her] father,” she places her father in the upper left side of her gesture space with her left index finger (see Fig. 1). She continues her description and explains that “[her] father has an older brother,” who she places on the upper right side of her gesture space with her right index finger. She completes her explanation and says that “[her] father’s older brother has a child too” and places this relative, who is her first cousin, by lowering her right index finger on a vertical departing from the invisible point where her father’s older brother was placed earlier in discourse. The four people involved in this description (i.e., the speaker herself, her father, her paternal uncle, and her cousin) are grouped in space. The speaker and her father are placed on the speaker’s left side, and the uncle and the cousin are grouped together on her right side. This example provides a transparent illustration of the inherently relational nature of kinship relations. As Enfield coins it, the gestures produced by the Lao speaker are “cognitive artifacts,” which she

employs to both think and communicate about the conceptual diagrams that connect her to her first cousin.

Are these “polysemiotic signs” (i.e., speech + gesture) meaningful forms that are culturally specific to Lao speakers? First, given the universality of family relations, the inherently relational nature of kinship, and the spatial affordances of gestures, we can reasonably expect to find similar cognitive artifacts across most, if not all, cultures of the world. Second, given that the structure of the world societies varies in the way they group family members into distinct categories, we can also reasonably expect to find variation across the wide diversity of ethnolinguistic groups. Taking into account the body of compelling evidence from gesture studies that gestures provide a second window onto a speaker’s mind, the systematic analysis of the meaningful body movements that are produced in combination with verbal descriptions of kinship relations and with other semiotic systems like depiction can provide novel insights into the way people conceptualize their core social structure: family.

This paper is an exploratory study that aims to investigate whether people activate a spatial template to think about the complex relational structures of family relations as evidenced in the spoken, gestured, and drawn descriptions of family relations. We investigate this question with data from a lesser-known and studied ethnolinguistic community to the cognitive sciences: the Paamese people of Vanuatu. In Section 2, we describe the current study, provide the linguistic and cultural background of Paamese kinship relations, and introduce a number of social structures and practices that play an essential role in the organization of Paamese society. We define the methods we employed in the study in Section 3. In Section 4, we present the results of a number of quantitative and qualitative analyses of this rich polysemiotic data. Based on these results, we argue in Section 5 that Paamese people activate a spatial template to think and communicate about kinship. We find that this spatial template is laterally structured with regard to lineality, with family members from the mother’s side on the left, and members from the father’s side on the right. We also find that the gestures produced by Paamese participants during verbal descriptions of marital relations are performed significantly more often on two diagonal directions of the sagittal axis. We show that these diagonals are also found in the few diagrams that participants drew on the ground to augment their verbo-gestural descriptions of marriage practices with drawing. We discuss these findings and their contribution to kinship studies and generate two new hypotheses, to be tested in further research. We close this paper with concluding remarks in Section 6.

2. The current study

Asymmetrical patterns of descent and prevalent cousin marriage are two types of social structures that were found to be predictors of kinship typology at the macro-scale of the world societies (Rácz, Passmore, & Jordan, 2020). This finding brings support to the hypothesis that social structure shapes kinship naming systems. These two structures are foundational to the organization of the Melanesian society of Paama, Vanuatu, which thereby provides an ideal natural experimental setting to test this finding at the fine degree of granularity that a community-level study affords.

Asymmetrical patterns of descent—henceforth “unilineality”—structure Paamese social life. As a society that predominantly relies on horticulturalism and pastoralism for its subsistence, the Paamese people own cattle and land to grow food. When human societies shift from a typically equalitarian foraging lifestyle to a mode of subsistence where goods, land rights, and cattle ownership are transmitted to the next generation, they tend to become patrilineal (Holden & Mace, 2005), which means that membership to a core social unit (e.g., a clan) and its accumulated wealth (e.g., cattle, land) is acquired by male heirs from their fathers. Paamese society is in that sense a typical patrilineal society, which has numerous implications for the daily life of the inhabitants of this small Pacific Island. The Paamese system marks a terminological distinction between members of the patriline versus matriline at the generation “above” Ego’s generation (i.e., $G + 1$). *Itet* is a term used both for Ego’s genetic father but also for all of Ego’s paternal uncles, in contrast to maternal uncles, who are referred to with the distinctive kin term *avop*. Paamese society consists of 21 social units called *nakamal*, which are settled as small villages across the island. Each *nakamal* consists of a number of clans called *aamal*, who own part of the *nakamal*’s land for residence, horticulture, foraging, and part of the coastal waters for fishing. The 21 *nakamal* of Paama island are physically connected with a number of paths. Paamese society traditionally practices “patrilocal exogamy,” which entails that spouses come from different *aamals* (i.e., the exogamous dimension) and that the wife leaves her clan to permanently reside on her husband’s territory (i.e., the patrilocal dimension). When people marry, there are therefore actual motion events along physical paths, from one *aamal* to the next. When Paamese marital unions take place in their traditional ways, not only do they continue weaving a pattern of an already existing mat—to use a local metaphor—but it also creates new connections. When a woman marries into her husband’s *aamal*, their children will grow up within their father’s clan, but they keep a strong link with their mother’s side of the family. It will be one of the mother’s brothers who will name a newborn son after him and one of the mother’s sisters who will name a newborn daughter after her. The marriage and the naming of children by the mother’s siblings “opens a new line” between the two clans, which will eventually allow for future marriages to take place: The maternal uncle, who names his sister’s son, is the father of the potential future husbands of one of his nephew’s daughters (Fig. 2).

Members of bifurcate-merging societies—such as Paamese society—forbid marriage between parallel cousins (i.e., a cousin from a parent’s same-sex sibling), who are considered and referred to as siblings for that purpose but encourage marriage across cross-cousins (i.e., a cousin from a parent’s opposite-sex sibling; Murdock, 1947). In traditional Paamese rules of marriage, marital unions to cross-cousins of the patriline are preferred to those of the matriline, but both are culturally accepted. Marrying someone on the patriline is described as *musil mariso sise* “taking the big road” and marrying someone on the matriline as *musil havivi sise* “taking the small path.” Paamese marriage rules are structured in a way that results in a generational gap between spouses: a male ego’s wife is one of his cross-cousin’s children, and therefore a female ego’s husband is one of her father’s mother’s brother’s children as illustrated in Fig. 2.

In sum, unilineality and prevalent cousin marriage are two foundational structures of Paamese society. Given the relative diagrammatic complexity, we examine if these structures

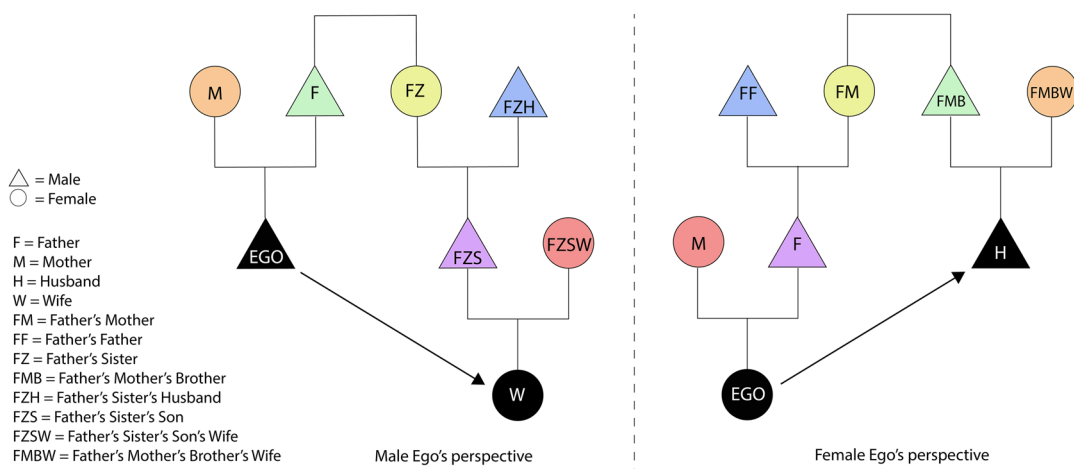


Fig. 2. Paamese marriage rules from the perspectives of a male and female ego. Kinship relations of the same color are identical across perspectives. The male ego's father (F) names one of his sister's son (FZS) after him and calls him *metelau* "nephew." This nephew calls his maternal uncle *avop*. From the female ego's perspective, this nephew is actually her father (F), and her father's maternal uncle (FMB) is her husband's father.

are encoded in the verbal, gestural, and pictorial descriptions of kinship relations produced by 40 Paamese adult participants, using the elicitation method of semi-guided kinship interviews (Enfield & Levinson, 2003).

The two foundational cognitive processes that are essential in the conceptualization of kinship are viewpoint and relational thinking. Given the relative complexity of these two cognitive processes, and in line with previous findings establishing how speakers activate a spatial template to think and communicate about complex structures (e.g., Enfield, 2005), abstractions like time (e.g., Boroditsky & Gaby, 2010; Gaby, 2012; Núñez & Sweetser, 2006) and numbers (Woodin et al., 2020), we expect to find converging evidence from the verbo-gestural-pictorial data that kinship structures are mapped onto space. We expect this "kinship spatial template" to be structured by both universal cognitive processes (i.e., viewpoint and relational thinking) and culture-specific social structures (i.e., unilineality and prevalent cousin marriage).

3. Methods

3.1. Participants

Forty native Paamese speakers (17 F, 23 M) were interviewed about kinship relations in Paama. Their average age was 39 years ($SD = 16.87$, range 18 to 79 years). Twenty participants lived on Paama island, and the other 20 lived in Port Vila, the capital of Vanuatu, where they were interviewed. The kinship interviews took place outside of the participants' homes. Participants were paid for participation. Ethical approval was obtained from the Vanuatu

Cultural Centre and from the Swedish Ethics Review Authority (Etikprövningsmyndigheten). All participants gave video-recorded oral informed consent.

3.2. Materials

The kinship interview is a production task aimed to elicit verbal and gestural descriptions of family relations in the format of a direct interview (Enfield & Levinson, 2003). The interviewer asked five questions in Paamese, sequentially organized in the following script:

1. I am interested to know more about your extended family. Please think about as many people who are part of your clan as possible. Can you tell me who they are, and how they are related to you and to each other?
2. Who is your *avoplauntie* (i.e., maternal uncle/aunt)?
3. Is this person important to you? Why?
4. (a) How did you and your spouse meet, (b) how did your parents meet (if the participant is not married)?
5. Can you tell me who you are/one is supposed to marry on Paama?

The participants' geolocalization and the direction they were facing during the interview were systematically collected with a compass. The participant-centric data were then mapped onto the coordinates of Paamese villages and Port-Vila communities and converted to the numerical coordinate-coding system used for the gesture space. Following Enfield and Levinson's (2003) recommendation, a stick was made available to the participants who were told at the beginning of the interview that they could use it to draw on the ground to complement their explanation. The interview was recorded with a video camera facing the participant and placed at a distance that allowed their whole body to be visible as well as the extension of their hands and arms, and a birds-eye view camera used to capture the participant's drawings. The sound was recorded by a Zoom H4N device and a portable wireless lapel microphone system clipped on the participant's clothes.

3.3. Procedure

Participants were interviewed individually and informed that they were going to be asked about their extended family in Paamese. For the sake of cultural norms and sensitivities, and ecological validity, interviews were done outside of the participant's habitation and not indoors. The interview was conducted by one of the authors (SD), who is a non-native member of Paamese society and who has a good command of the language. This choice was motivated by the fact that it would have been artificial for a member of the small and tight-knit Paamese society to ask questions, for which they already knew the answers. The participants were asked the series of five questions listed above in the same order for each individual. They were free to describe as many or as few family relations as they wanted and were not encouraged to provide more or less information. The interview was concluded when participants finished answering the fifth question.

3.4. Coding

Audio–video recordings were imported into ELAN (<https://archive.mpi.nl/tla/elan>) for coding the speech and gestures produced by the participants during the interviews. Speech was transcribed in ELAN and imported into Toolbox (<https://software.sil.org/toolbox/>), where morpheme boundaries were segmented and glossed based on Crowley’s (1982) grammar of Paamese, and exported back into ELAN for further coding.

3.4.1. Segmenting and coding verbal data

Speech was segmented into intonation units. A falling intonation followed by a pause, itself followed by a segment with a contrasting initial pitch level, is generally taken to indicate the boundary of an intonation unit (see Green, 2014, p. 76). A total of 4055 speech units were identified, but we limited the annotation of the verbal data to those that would potentiate insights into the way members of a given society think and communicate about two of their core social structures (unilineality and prevalent cousin marriage) and whether we find evidence of a spatial template that leaves traces of its structure in speech. We restricted our annotation of the verbal data to (a) the descriptions of kinship relations using terms that are transparent with regards to a specific “side” of the family (i.e., patriline vs. matriline), (b) the descriptions of marital kinship relations, and (c) the spatial terms used to describe kinship relations.

Accordingly, we identified the verbal kinship descriptions of the type F (father), M (mother), FZ (father’s sister), FB (father’s brother), MZ (mother’s sister), and MB (mother’s brother), which were coded with their corresponding lineality (i.e., patriline vs. matriline). The semantics of the kinship terms used to refer to F, M, FZ, FB, MZ, and MB leave no ambiguity regarding their lineality. In contrast, other terms, like those to refer to grandparents (e.g., *avu letao* “grandmother”) or cousins (e.g., *uan* “cross-cousin”), can be used for kin of either side of the family and were therefore not included in the dataset. In order to gain information about the way Paamese speakers communicate about marital relations, we identified the speech units containing kinship terms of the type SP (spouse), W (wife), and H (husband), as well as constructions including verbs referring to marital unions (e.g., *retalihe* “marry”). We identified a total of 1701 descriptions of kinship relations of the “lineal type” ($n = 975$) and “marital type” ($n = 726$).

All descriptions were then coded for their spatial semantics based on Crowley’s (1982, 1992) description of Paamese. Spatial terms were used in 710 descriptions of kinship relations. However, verbal descriptions of kinship relations produced in reference to a physical landmark as in (1) were excluded from further coding and analysis because they describe a situation that is anchored in actual space, not the hypothetical abstracted spatial template that Paamese speakers may activate when they communicate about kinship as in (2). A total of 109 speech units were used to describe physical space, which left 601 abstracted spatial descriptions of kinship relations for analysis. Although we did not further analyze these 109 kinship descriptions, which were anchored in physical space, the proportion of physical versus abstract space (i.e., 15%) may be of use to future cross-cultural analyses.

(1) *Mama onak tenaot Lironessa*

Mother POSS-1SG prep Lironessa

‘My mother is from Lironessa’

(2) *Usite onen Mama onak*

Side POSS-3SG mother POSS-1SG

‘On my mother’s side’

3.4.2. *Segmenting and coding gestures*

We limited the identification of gestures to hand gestures and segmented them into units following Kendon’s (2004) definitions. Gesture units are identified and annotated as gesture excursions starting from a place of rest (e.g., hands on lap, down along the sides of the body, etc.) and finishing at a place of rest. Gesture nuclei are identified as either a stroke, a stroke plus a post-stroke hold, or simply a hold (or “stroke-less hold,” see Kita, van Gijn, & van der Hulst, 1998). The *stroke* starts at the first frame of the motion. It can start from either the end of a preparation movement, a pre-stroke hold, directly from the end of a previous stroke, or a place of rest. It ends at the last frame of the motion or, if there was a post-stroke hold, at the last frame of the hold and can be followed either by a retraction or a preparation for a new stroke or end at the place of rest. The *hold* starts at the first frame where the movement reaches its apex (i.e., the point of furthest reach) and ends at the last frame at the apex, before the speaker retracts the articulator from that location. The nucleus is the meaningful, or expressive, part of the gesture (Kendon, 2004) and is therefore the relevant level of gesture segmentation that is considered in the present study.

The gesture nuclei that are partially or fully temporarily aligned with some of the 1701 descriptions of kinship relations described in the previous section were included in the analysis. If a speech segment was only partially overlapping with the gesture nucleus, the part that fell outside of the segment was included in brackets, for context (e.g., *(ma)ma onak* “my mother”). The G-nuclei were annotated with their coordinates on the gesture space (see Fig. 4). Holds were coded with a single coordinate for the apex, while strokes were coded with two individual coordinates, one for the point from where the gesture nucleus started and one for the point where the stroke ended. This coordinate-coding system allows us to code with an optimal consistency where in the gesture space a gesture takes place, on which plane (horizontal, vertical, sagittal, or a combination), and in which direction. For example, the stroke produced by the Paamese participant in Fig. 4 was coded with a value “M1-M8.” This means the speaker made a leftward diagonal gesture (on the sagittal axis) as illustrated in Fig. 3.

A total of 604 gesture nuclei overlapping with verbal descriptions of lineal and marital relations were identified and coded following this procedure. It was common for the Paamese participant to introduce their family members in relation to the village they were originally from. This type of verbal description can be accompanied by a pointing gesture taking a specific direction. It was necessary to exclude this type of gesture because they refer to a

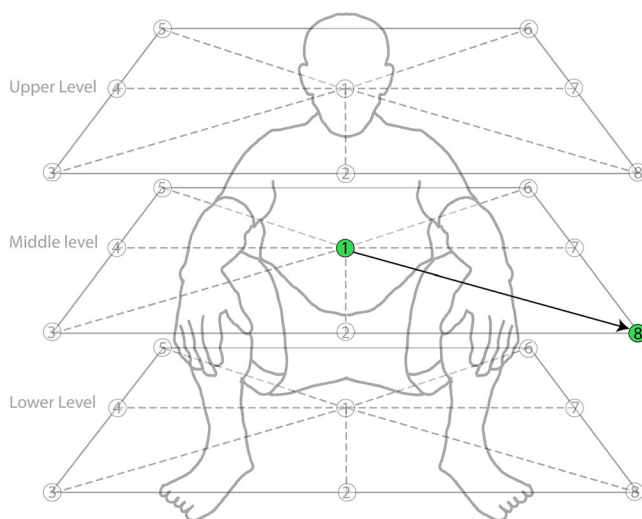


Fig. 3. Gesture space coding grid (example of an M1-M8 stroke).



Fig. 4. An M1-M8 type of gesture.

landmark that is anchored in actual space and not to the hypothetical spatial template the activation of which we are investigating here. On rare occasions, some family members of the participants were off camera but within sight, and their position relative to the speaker's position was therefore also noted during the interview, so that if the participant made a gesture in the direction of their spouse when talking about them, we also excluded this gesture nucleus from our analysis. These additional and necessary meta-data helped us be conservative about the potential meaning of the co-speech gestures produced by the participants. Following this procedure, we excluded 103 gesture nuclei and kept 501 for analysis.

3.4.3. Reliability analyses

A research assistant (LLD) with a good command of Paamese and two native speakers of Paamese (HKTK & ET) transcribed, translated, and glossed all verbal descriptions. A research assistant (LBA) coded all gestures accompanying verbal descriptions of kinship relation. A second independent coder (SD) annotated 100 gestures for their coordinates on the gesture space, constituting 19.8% of the total number of gestures in the dataset ($n = 501$) to establish reliability. We observed a modified Cohen's kappa of 0.86, indicating high agreement (Landis & Koch, 1977).

4. Analyses

4.1. Lineality in speech and gestures

Of the 501 gesture nuclei overlapping with linguistic kinship descriptions that were kept for analysis (see Section 3.4.2), 194 nuclei overlapped with verbal descriptions of the kinship relations F, M, FZ, FB, MZ, and MB. These gestures were produced by 29 of the 40 interviewed participants, 20 of which were men.¹ They were between 18 and 79 years old, with an average of 41.2 years. The place of residence of 15 participants was Port Vila (VLA) and that of the remaining 14 was Paama island (PMA). Each of the 194 co-gesture speech units was coded for lineality (F, FZ = patriline; M, MB = matriline). For the lineality analyses, the gesture space coordinate values (see Section 3.4.4) of the 194 gesture nuclei were collapsed into three categories: right side of the participant's personal space, its center, and left side. Table 1 shows the distribution of gesture lateralization as it was influenced by lineality, participant gender, and residence.

The numbers in the table show that left-lateralized gestures were more common when the participants talked about relatives from their mother's side, while right-lateralized gestures were more common when they talked about relatives from their father's side. The counts were analyzed as a generalized mixed effects model with gesture lateralization as the outcome variable, and lineality of the described kin, participant gender and participant residence as predictors (fixed effects), and random intercepts for participants. A model selection proce-

Table 1
Distribution of gesture lateralization

		Mother Side		Father Side	
		Left	Right	Left	Right
Paama Island	Male	48 (0.83)	10 (0.17)	8 (0.25)	24 (0.75)
	Female	8 (0.67)	4 (0.33)	0 (0.00)	28 (1.00)
Port Vila	Male	12 (0.63)	7 (0.37)	10 (0.48)	11 (0.52)
	Female	17 (1.00)	0 (0.00)	1 (0.14)	6 (0.86)
		85 (0.80)	21 (0.20)	19 (0.22)	69 (0.78)

cedure was followed with a model with random effects only as a starting model, to which the fixed effects were added one after another, initially as main effects only, and then as two-way interactions, and finally as a three-way interaction. The most complicated model that could be identified within this procedure without convergence issues contained the main effect of residence and the interaction of participant gender and lineality (likelihood ratio test: chi-squared = 5.155, $df = 1$, $p = .023$). The factor residence, however, was not significant in this model and could be omitted from the model because it was not significantly different from a model without this predictor (likelihood ratio test: chi-squared = 0.087, $df = 2$, $p = .958$). Therefore, the selected model to be presented below contained only the interaction between lineality and participant gender.

Fig. 5 shows the estimated proportions of gestures to the right based on the selected model. There is a clear effect of lineality as also observed in Table 1. In addition, the figure suggests that the lineality effect is more pronounced (but not significant) in female participants (whose estimated proportions are closer to 1 and to 0) than in male participants (whose estimated proportions are somewhat further away from 1 and 0).

Out of the 194 gesture nuclei that overlapped with verbal descriptions of the kinship relations F, M, FZ, FB, MZ, and MB, 62 verbal descriptions used spatial terms, which were of three types: *usite* “side” ($n = 23$), *laen* “line” ($n = 14$), and *sise* “path” ($n = 25$), as illustrated in (3), (4), (5), respectively.

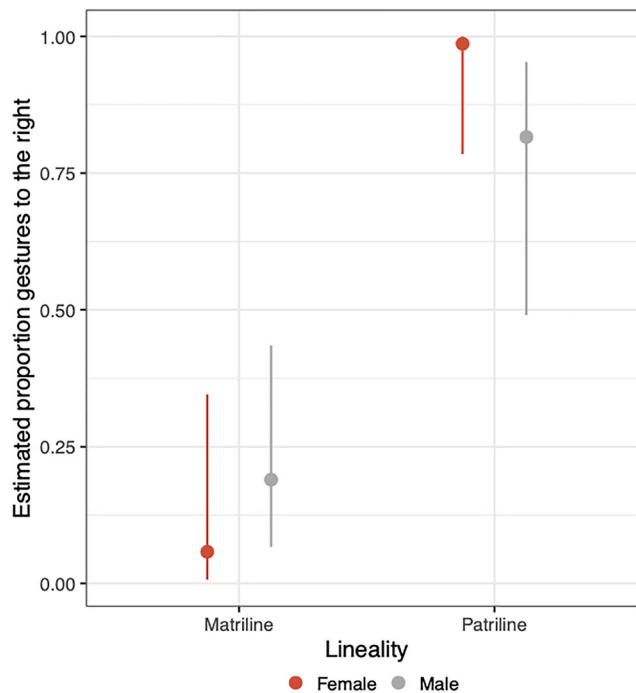


Fig. 5. Proportion of gestures overlapping with verbal descriptions of kinship relations (matriline vs. patriline) to the right side of the speaker’s gesture space.

(3) *Usite ten family onen tata*

Side prep family POSS-3SG father

‘On my father’s side of the family’

(4) *Family laen onak evus tata onak keitel ehat*

Family line POSS-1SG prep father POSS-1SG 3PCL num.4

‘On the family line where my father was born, they are 4 siblings’

(5) *Sise onen mama onak*

Path POSS-3SG mother POSS-1SG

‘On my mother’s path’

4.2. *The description of marital relations in speech, gesture, and drawing*

The 305 descriptions of marital relations that were accompanied by a gesture were produced by 12 female participants (with an average age of 42 years) and 19 male participants (with an average age of 41). Out of 305 polysemiotic descriptions of marital relations, 118 verbal descriptions encoded the semantics of space. Their types and frequency are reported in Table 2.

Kur, is a caused-motion verb meaning “take” but also “marry”, metaphorically, as in (6).

(6) *Natukahin kur meatin ta tenaot saot Paama*

Child-1SG-female take man num.1 prep south Paama

‘My daughter married a man from south Paama’

The noun *sise* is the Paamese word for “path” and can be used both for physical paths and to refer to lineality. *Sise* can in this case be used in a construction with the motion verb *musil* “follow” as in *namusil sise onen Mama onak* “I followed my mother’s path/line,” which means the speaker married a person who is related to her from her mother’s side of the family. The Bislama terms *laen* “line” and *usite* “side” are used to describe lineality. *Stret* (Bislama) is used to describe something that is “the way it should be according to tradition.” For example, *stret asun* means “rightful spouse” that a Paamese person is supposed to marry according to traditional rules of marriage (see Section 2).

Table 2
Distribution of marital descriptions with spatial semantics

Type	Gloss	Frequency
<i>Kur</i>	“take”	77 (0.65)
<i>Musil sise</i>	“follow path”	15 (0.13)
<i>Laen</i>	“line”	15 (0.13)
<i>Stret</i>	“straight”	8 (0.07)
<i>Usite</i>	“side”	3 (0.02)

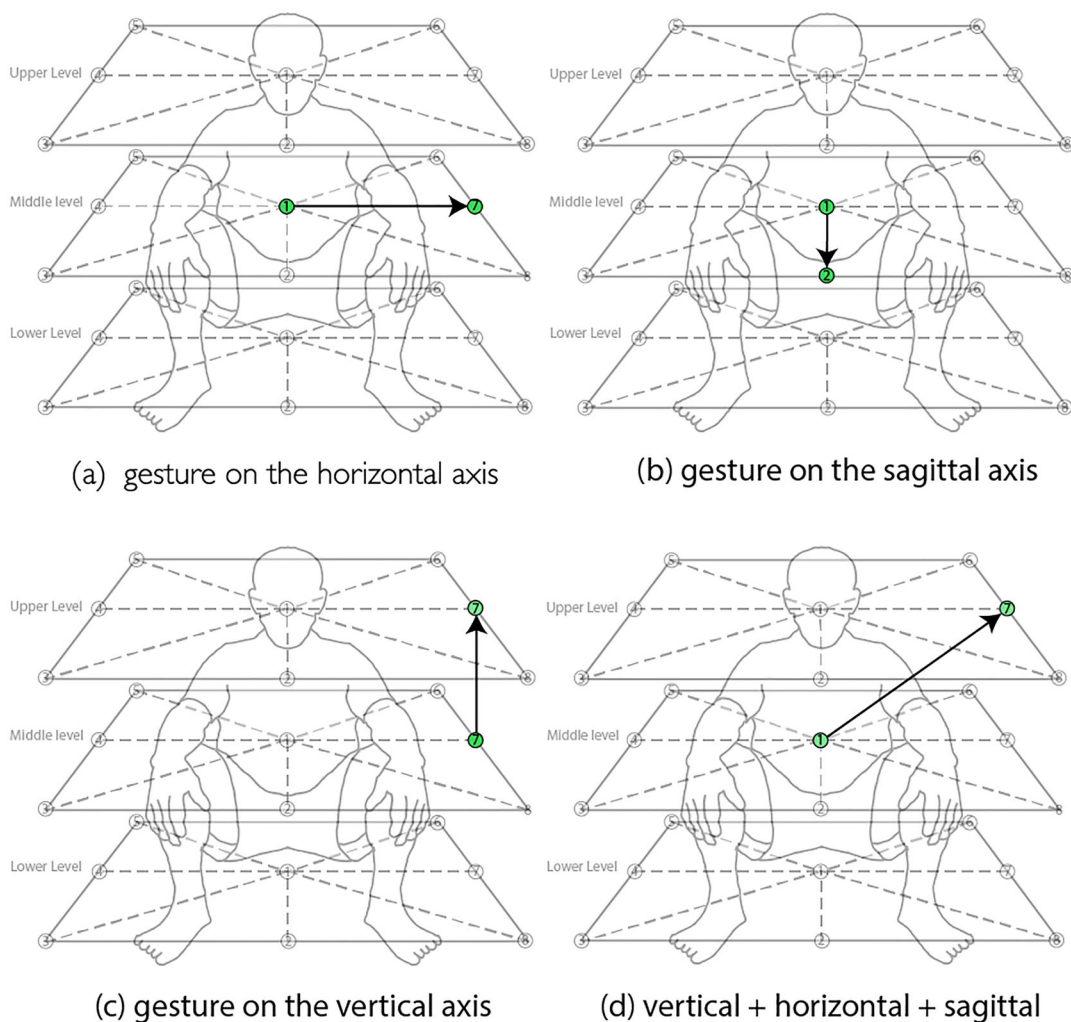


Fig. 6. Gestures strokes can be performed on the horizontal, sagittal, and vertical axes or on a combination of axes.

Gesture strokes can be performed on the horizontal axis (Fig. 6a), on the sagittal axis (Fig. 6b), on the vertical axis (Fig. 6c), or on a combination of axes (Fig. 6d).

Table 3 shows an overview of the axes and directions of the gestures that were produced during descriptions of marital relations.

To assess whether the occurrence of gestures on different axes is random or exhibits a bias, a chi-square test of independence was employed. The test helps determine whether the distribution of gestures across the three axes is independent or if there exists a significant association. The chi-square test yielded a statistic of $X^2 = 489.41$ with two degrees of freedom. The associated p -value was found to be $< 2.2e-16$, indicating an extremely low probability of observing such a strong association between the axis variable and the observed

Table 3
Gesture axis and direction

Axis	Frequency	Direction	Frequency
Horizontal	15	Left	6
		Right	9
Sagittal	283	Left diagonal	163
		Straight	25
		Right diagonal	95
Vertical	7	Down	6
		Up	1

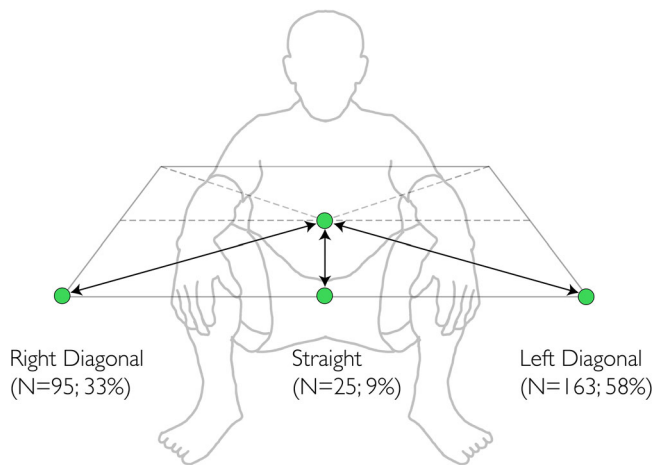


Fig. 7. The distribution of gesture strokes performed on the sagittal axis.

frequencies by chance alone. The chi-square test suggests that the distribution of gestures across the horizontal, vertical, and sagittal axes is not random, implying a systematic bias in the production of gestures when Paamese speakers discuss marital relations.

Given the overrepresentation of the gestures performed on the sagittal axis, we conducted a focused chi-square analysis to delve into the specific distribution of these gestures among three distinct directions: “LeftDiagonal,” “RightDiagonal,” and “Straight.” Their distribution is visualized in Fig. 7. The resulting contingency table illustrates that out of a total of 283 observed gestures along the sagittal axis, 163 were categorized as “LeftDiagonal,” 95 as “RightDiagonal,” and 25 as “Straight.” The chi-square test yielded a statistic of $X^2 = 97.347$ with two degrees of freedom. The associated p -value was found to be $< 2.2e-16$, indicating an exceptionally low probability of observing such a robust association between the “direction” variable and the observed frequencies purely by chance. The results strongly suggest that the distribution of gestures is not random across the three different directions recorded on the sagittal axis, pointing toward a systematic bias in the production of gestures when Paamese speakers engage in discussions about marital relations.



Fig. 8. Pictorial production of family relations performed by participant KDN03.

A stick was made available to the participants who were told that they could use it to draw on the ground to complement their explanation. Three participants decided to use the semiotic resource of depiction to augment their verbo-gestural descriptions of marital relations and practices on Paama. Participant KDN03 made extensive use of this semiotic resource and made the drawing reproduced in Fig. 8. There is no obvious lateralized structure in what looks like a family tree, which would support the lateralization of the gesture space. However, the participant decided to only draw members of his patriline, therefore the pictorial data neither confirm nor contradict the gestural data on the lateralization finding.

An interesting part of KND03’s drawing performance is the diagram on the left of the picture, which is reproduced and focused on in Fig. 9. KDN03 produced this part during his spoken description of marital practices on Paama.

Example (7) is a transcription of the strokes drawn in the ground (reported on the first line of the interlinear example), which are temporally aligned with the spoken description.

(7)
Kastom asumaitel vahi [pause],

Customary spouse.1PCL.EXCL 3SG.IMM.FUT-be

‘Our traditional spouse it will be [pause],

.....|1|-----|2|-----|

sista onen tatake,

sister POSS.3SG dad-prox

dad’s sister here,

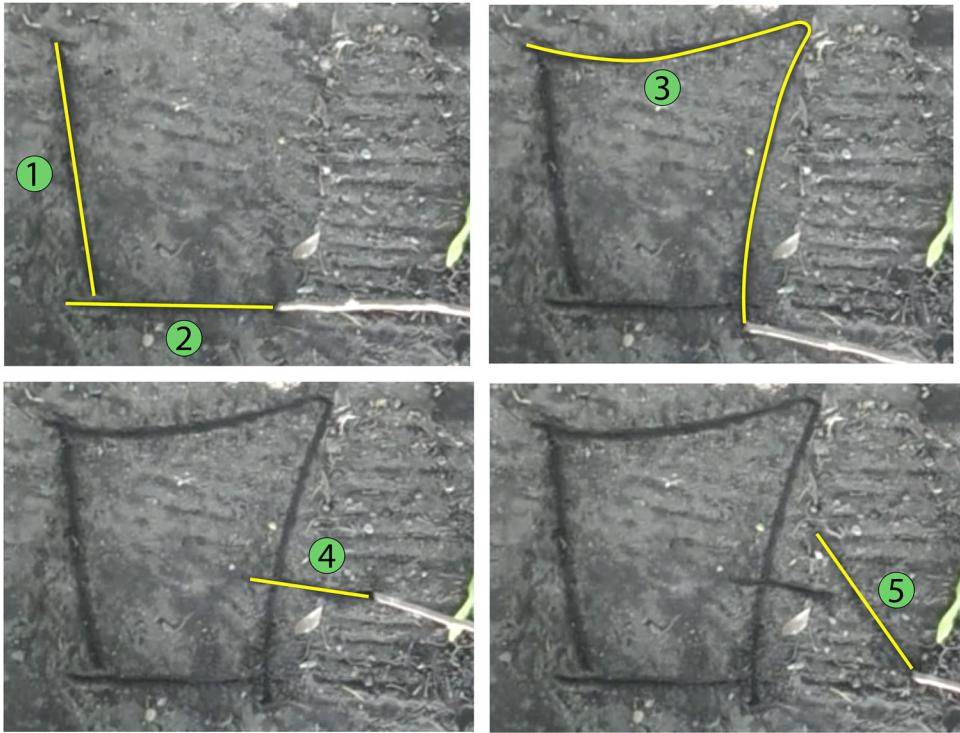


Fig. 9. A drawing performed by a Paamese participant when describing who he and his brothers can marry according to traditional practices. The drawing consists of five strokes.

[3]-----|.....|4|-----|
titan [pause] *ale vahi* *uanke*
 child.3SG so, 3SG.IMM.DIST-be cross.cousin-prox
 ‘her child [pause] so, this one will be our cross-cousin here,

[5]-----|
ale, titanke.
 so, child.3SG-prox
 his child here (is our customary spouse)’.

Stroke [5] takes a distinctive diagonal direction compared to the other strokes of the diagram, and it is temporally aligned with the spoken reference of the distant kin whom KDN03 is supposed to marry according to traditional marriage rules. KND03 does not provide any more spoken description of the arranged marriage practice but concludes his polysemiotic



Fig. 10. Crossed diagonals drawn in the conclusion of the segment of the interview where KDN03 described marital relations on Paama.

description with these two additional crossed diagonals strokes, which are reproduced in Fig. 10.

Another polysemiotic description (speech + depiction) of marital relations was produced by participant KDN05. The drawing performed during this segment is reproduced in Fig. 11 and the transcription of this part of the interview is reproduced in Example (8).

- (8) |1|-----|2|-----|..|3|-----|
Koani Rick, koani Ella. Mama onak isen Louise.
 DEM Rick, DEM Ella. Mum POSS.1SG name.3SG Louise
 ‘This is Rick, this is Ella. My mother’s name is Louise.
- |4|-----|.....|5|-----|
Tunali avisen Joshua. Rick mai kur Louise.
 brother.3SG name.3SG Joshua. Rick come take Louise.
 Her brother is called Joshua. Rick married Louise.
- |6|-----|.....|
Sista onen Rick mai kur Joshua. Stret (Bislama). En kastom orer mukone.
 Sister POSS-3SG Rick come take Joshua. Straight Prep custom POSS-1PL.INCL.
 Rick’s sister married Joshua. That’s the right way. This is our tradition.’

Participant KDN05 drew a diagram on the ground where he explained how his parents’ marriage was arranged: His mother married a man (i.e., KDN05’s father), who was the brother of a woman, who herself married the participant’s mother’s brother. The four characters of this

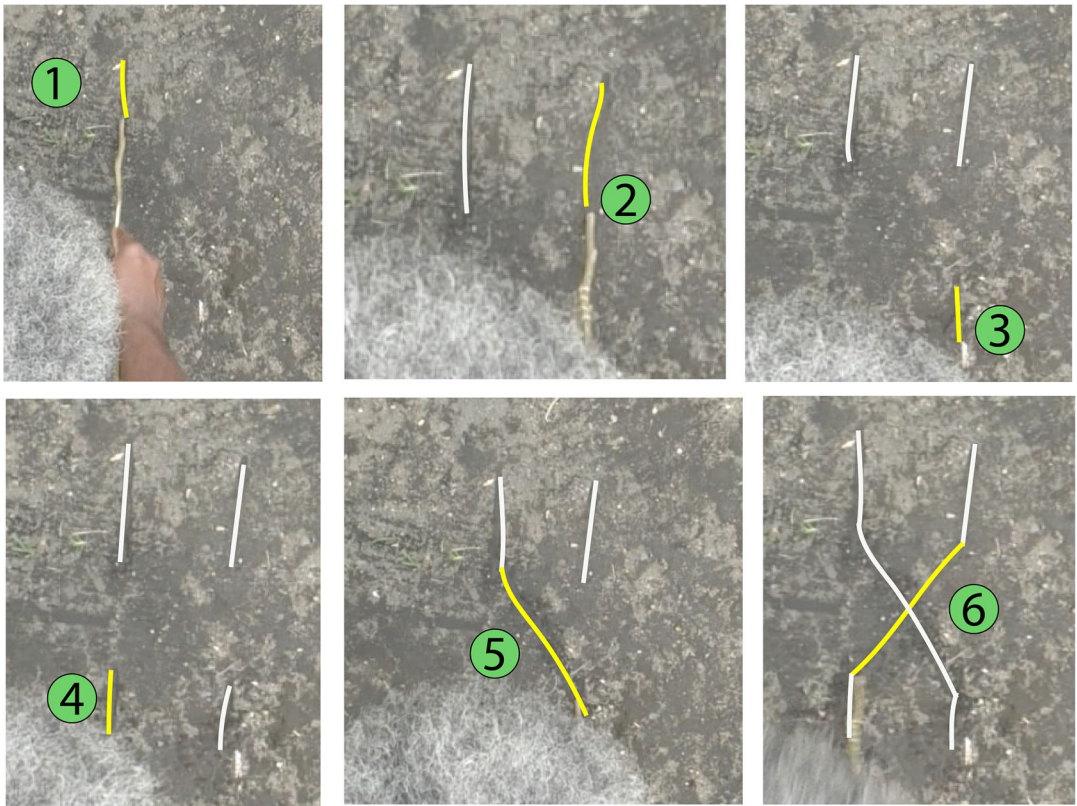


Fig. 11. A diagram drawn by a participant to describe how his father (Stroke 1), and his father's sister (Stroke 2) married another pair of siblings: the speaker's father married the speaker's mother (Stroke 3), and the speaker's father's sister married the speaker's mother's brother (Stroke 4). The marital relations connecting the two pairs of spouses are drawn in Stroke 5 and Stroke 6.

explanation are drawn as single strokes in |1|, |2|, |3|, |4| (see Fig. 11). KDN05 then connects the spouses with the two diagonals |5| and |6| which crosses in the middle of the diagram. He qualifies this type of arrangement as *stret*, a Bislama term describing “the way things should be,” which is found in other spoken descriptions of marital relations (see Table 2).

KDN10, the third participant who drew lines in the ground did not overtly comment on what she was drawing, or specifically referred to it, but she did draw these lines in the segment of the interview when she was asked about marriage rules on Paama (see Fig. 12).

The pictorial data were not produced by enough participants to treat it on par with the gestures that Paamese participants produced. Qualitatively, however, the drawings performed on the ground provide an additional source of insights. A shared geometrical pattern indeed seems to emerge from the pictorial productions of these three participants: They all trace diagonals that cross when describing marital relations in speech.



Fig. 12. Participant KDN10 did not specifically refer to the lines she drew in the ground, but she did produce these strokes when asked about Paamese rules of marriage.

5. Discussion

Our exploratory investigation unveils three primary findings, leading to the formulation of two hypotheses that warrant testing in future research.

5.1. Lateralization of the gesture space

Patrilineality bears great significance in Paamese culture (see Section 2). It structures the daily life of Paamese people, motivates inheritance practices, places of residence, and normalizes social behaviors. Marking a terminological distinction between family members from one's "mother's side" and one's "father's side" is a well-known parameter found in the languages spoken by unilineal societies, already identified by Kroeber in 1909 (Kroeber, 1909, pp.78–79). As a prototypical unilineal society, Paamese unsurprisingly mark this distinction: one's paternal uncles are referred to as *itet* "fathers" in contrast to one's maternal uncles, who are referred to as *avop* "maternal uncles." We cannot reasonably infer that the absence of such distinctions in some languages, like in most European languages, entails that their speakers are unable to distinguish their fathers' brothers from their mothers' brothers. However, we can argue that this distinctive parameter does not hold enough cultural significance for these kinship systems and practices to be linguistically encoded. The Paamese kinship terminological system draws lines, which generates kin categories, but beyond the fact that these categories are distinct, kinship terms tell us little more about the way Paamese speakers actually think about these family relations. The kinship terminology marks a contrast between the patriline and the matriline but does not overtly code any spatial dimensions. We ventured out of the list of Paamese kinship terms and found that terms like *laen* "line," *sise* "path," and *usite* "side" are used in discourse, and we argue that they describe landmarks and regions of the speaker's

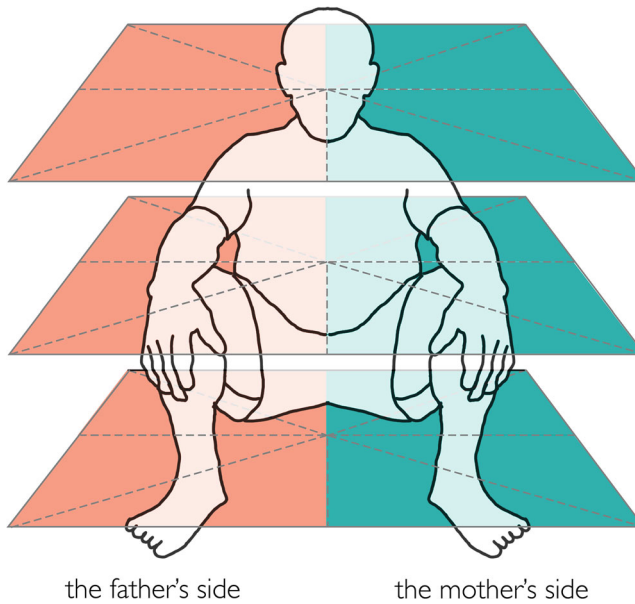


Fig. 13. Lateralization of the gesture space. The areas of the gesture space where Paamese speakers place their family members are significantly biased by the lineage of the family members referred to. Family members from the matriline tend to be placed on the left side of the speaker's gesture space, and family members from the patriline tend to be placed on the right side of the speaker's gesture space.

conceptual space. Gestures “complete” the spatial template on which distinct kinship categories are grouped and assign a specific location to the two distinct “sides of the family”: the father's side on the right and the mother's side on the left (Fig. 13).

Considering that gestures provide a window into a speaker's mind on the one hand and that the results of our analysis reported in Section 4.1 show a significant bias toward a lateralization of the gesture space based on lineality on the other hand, we argue that the co-speech gestures produced in temporal alignment with spoken descriptions of kinship relations provide valuable insights into the conceptualization of the Paamese landscape of family relations. We more specifically argue that the lineality parameter is not only culturally significant in Paamese society but also cognitively salient in the way Paamese people think about kinship relations.

The sign language and kinship literature have shown how certain family members can be associated with certain body parts to which a speaker points in many Australian communities (see Section 1.4). This body of literature demonstrates how extending investigations of kinship structures beyond kinship terminologies alone can reveal additional terminologically unmarked categories. By revealing that the placement of family members in the gesture space with hand gestures is not random, but significantly biased by their lineality, we also demonstrate the benefits, and perhaps the necessity, of integrating gestural data in the investigation of kinship structures. To the best of our knowledge, our study is the first to reveal the existence

of a lateralization of the gesture space structured on the distinction between the matriline and the patriline.

Moreover, the unprecedented finding about the lateralization of the Paamese gesture space as a marker of the parameter of lineality allows us to generate a novel hypothesis. We propose that the gestures that a community of speakers make serve as direct evidence for the conceptual structure of the spatial template that members of this community activate when they think and communicate about family.

Hypothesis #1: Unilineal society members have two distinct conventionalized regions of the conceptual space that they use to think and communicate about kinship structures. This social structure is found in the linguistic semiotic system (in the kinship terminology and set of spatial metaphors), in the gestural semiotic system (family members are placed in distinct regions of the gesture space based on their lineality), and in the pictorial semiotic system (pictorial representations of family relations reflects this spatial organization).

A number of predictions can be formulated in order to empirically test this hypothesis in controlled experimental settings. For example, our hypothesis would predict that if a community of speakers exhibits a significant tendency for a systematic lateralization of the gesture space based on lineality, then lineality will be a key parameter in the social structure of that community as measured by a set of cultural practices, social roles, behavioral norms, and so forth.

Should this hypothesis be verified, it would have important implications for studies in cultural evolution. Social structures change over time and with them kinship systems. As Holden and Mace (2005) evidenced, when human societies shift to pastoralism, kinship structures tend to become patrilineal. If future investigations confirm that polysemiotic descriptions of kinship relations are a reliable index for the conceptual structure of kinship systems, they could be used as a metric to trace structural shifts in societies. For example, if a future study would reveal that the younger generations of a traditionally patrilineal society display significantly less lateralization of their gesture space based on lineality, this could potentially indicate the erosion of the unilineal social structure.

5.2. The diagonals of marital relations on Paama

Analyses of the gestural descriptions of marital relations showed that their distribution over the vertical, horizontal, and sagittal axes was not random, and therefore biased by a variable. This finding yields the interpretation that the gestures produced by Paamese speakers when they describe marital relations are meaningful. A closer look at the distribution of these strokes shows that “marital gestures” are performed significantly more frequently on the sagittal axis, and with significantly greater frequency in the two diagonal directions, indicating a low probability of observing the observed frequencies purely by chance (see Section 4.2 and Fig. 7).

We have not found any trace of this specific spatial organization in the spoken descriptions of marital descriptions. Paamese speakers use spatial semantics to describe marital relations, like the caused-motion verb *kur* “take/marry,” the motion + landmark construction *musil sise*

“follow path,” the landmark *laen* “line,” the spatial region *usite* “side,” and the direction *stret* “straight/right way.” However, our qualitative analysis of the drawings performed by three Paamese speakers is insightful. Strokes drawn on the ground only took a diagonal direction when the speakers specifically described traditional rules of arranged marriage. Taken together, the pictorial–gestural evidence converges to the conclusion that these diagonals are meaningful conceptual components of a spatial template activated when Paamese people think and communicate about kinship. Available data do not currently allow us to identify the variable that biases the distribution of these strokes in the gesture and pictorial spaces. We can, however, formulate a hypothesis based on the findings of this study and on the knowledge of cultural practices of marriage arrangement in Paama.

The gesture space of Paamese participants is lateralized with members of the patriline on the right side of the speaker’s space and members of the matriline on the left side (see Fig. 13). According to Paamese traditional rules of marriage, a male ego is supposed to marry his Father’s Sister’s Son’s Daughter, and a female ego is therefore supposed to marry her Father’s Mother’s Brother’s Son (see Section 2). In sum, traditional spouses are connected by their patriline in accordance with the patrilineal structure of Paamese society. This preferred practice is described as “taking the big road” and as being “the right way” (*stret* in Bislama, *mal* in Paamese). Marrying someone from ego’s matriline is less prestigious but practiced and accepted. It is described as “taking the small path.” Considering the spatial organization of the patriline (to the right) and of the matriline (to the left) on the one hand, and the Paamese marriage rules and practices on the other hand, we formulate the following hypothesis.

Hypothesis #2: The diagonals that Paamese speakers draw in the air and in the ground are iconic signs of the conceptual paths that Paamese people take to marry their spouses. The direction that these diagonals take (to the right or to the left) are significantly biased by the nature of the marital union: A diagonal stroke to the right describes a union on the patriline, and a diagonal stroke to the left describes a union on the matriline.

The verbo-gestural description that KDN18 provides is rich in details about the potential meaning of these diagonals (Fig. 14 and Example 9).



Fig. 14. Gestures produced by participant KDN18 in her description of marital relations.

- (9)|-----1-----|
Inao nakur G. Sakini namusil sise onen mama onak ka,
 1SG 1SG.take G. Therefore 1SG.follow path. POSS-3SG mother POSS-1SG. and
 ‘I married G. Therefore, I followed my mother’s path’
-|-----2-----|.....
rovite vahi stret ahoi ahk. Nihiteni mukok!
 NEG.BE 3SG.IMM.DIST-BE straight fiancé POSS-1SG. 1SG.explain like.that
 ‘I did not marry my rightful spouse. I would explain it like that!’

In this segment of the interview, KDN18 traces a first left diagonal |1|, which temporally aligns with a verbal description of her mother’s path, which connects her to her husband G. She contrasts it verbally with a reference to the person she was supposed to marry (a rightful spouse from her patriline) but did not. This verbal description aligns with a second gesture |2|, which is traced in the opposite diagonal direction. This polysemiotic description of KDN18’s marital relation can be argued to be the key that illustrates the association between the direction of the diagonal gestures and the family line that connects Paamese spouses in the conceptual architecture of kinship relations. This is a single and isolated piece of evidence that does not verify the hypothesis but provides good reason to consider that it is worth testing in experimentally controlled settings.

5.3. The activation of a spatial template to think and communicate about kinship

When Paamese people talk about their relatives, they do so in terms of space 42% of the time ($n = 1701$, see Section 3.4.1); 15% ($n = 109$) of the spatial descriptions of kinship relations are anchored in physical space: the referred kin’s island or village of origin, their place of residence, and their current location at the time of the interview. Beyond these physical anchors, the results of our analyses suggest that the remaining 85% ($n = 601$) of spatial kinship expressions support the existence of an abstracted spatial template that speakers use to think and communicate about kinship relations.

Taken together, the polysemiotic descriptions (speech + gesture + drawing) of kinship relations analyzed in this study provide evidence in support of the existence of a spatial template that Paamese speakers activate to think and communicate about complex kinship diagrams. We therefore argue for the necessity to adopt a systematic polysemiotic approach to the investigation of kinship structures. The integration of spatial metaphors, gestures, and pictorial productions in addition to kinship terminologies can reveal, with greater accuracy, which fine-grained parameters of social structures hold significance in cultural contexts and which do not.

Kinship terminologies are only one source of data from one very specific semiotic system (i.e., language). Their explanatory potential to reveal underlying social structures is

necessarily limited once communication is recognized as a complex, multimodal phenomenon. We argue that we should broaden our understanding of kinship systems beyond lists of words. Our study illustrates that it not only provides a more complete picture of kinship but also gives insights into the underlying cognitive conceptualization of the given kinship system.

6. Conclusion

To summarize, our exploratory study found that Paamese speakers activate a spatial template to think and communicate via speech, gesture, and drawing about kinship relations. There is neither reason nor evidence suggesting that Paamese people are exotic outliers of the world's populations, and therefore we can reasonably conclude that the scope of our findings extends far beyond this specific ethnolinguistic community, at least on principle and as a starting point for future investigations. This study allowed us to generate a number of hypotheses and falsifiable predictions, which should be tested in future research.

The segments of the spatial template that we argue we have revealed with this study appear to be structured by the core dimensions of kinship relations, that is, relational thinking and perspective taking. Further investigation aiming to chart this conceptual map of kin cognition would have an impact on several research fields, for example, in kinship typology, or in language and conceptual acquisition.

Integrating spoken, gestured, and drawn descriptions of kinship relations in addition to kinship terminologies would help us identify a far more detailed and complete list of parameters like the “lateralized lineality” parameter that this study identified. Once advanced enough, these new parameters would eventually allow us to redefine kinship types and hereby greatly contribute to the field of kinship typology.

We still know close to nothing about the ontogeny of kinship concepts, even though every child of all the world's societies acquires them, making them an optimal testing ground for investigating patterns of linguistic, cultural, and cognitive diversity. What happens, for example, in bilingual situations where children receive inputs from languages that structure kinship differently, and from parents who would (supposedly) make different associated gestures and drawings? What happens in situations of majority/societal language and cultural pressures? If a person receives a dominating amount of input from the societal language, does this person's “heritage conceptualization” of family relations erode over time? Such investigations would greatly contribute to current theories pertaining to linguistic and social structures: Do changes in the structure of language potentially impact the structure of societies over time?

This paper not only demonstrates the need for developmental and evolutionary studies in the investigation of kinship but also argues for the necessity to extend such investigations beyond speech alone. Kinship is one of the most researched fields of investigation in anthropology, but we believe that this paper has brought to light that it remains a vast and underexplored territory that can lead to further fascinating insights about the human mind and social organization.

Note

- 1 The fact that the interviewer was a male outsider may have had an impact on the production of gesture by younger Paamese women, who were not as confident as men and older women.

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