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Developing Kinesemiotics: Challenges and solutions using the Functional Grammar of Dance

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This article aims to test the applicability and the possibility of adaptation of the Functional Grammar of Dance, which is at the core of the development of the new interdisciplinary research area called Kinesemiotics. As a model of analysis for movement-based communication, the Functional Grammar of Dance has already been used for the analysis of classical ballet choreography, and it is currently employed in a collaborative research project involving the authors of this article and their research group at Loughborough University in the UK, the University of Bremen in Germany, and the English National Ballet. The testing opportunity is provided by the challenging analysis of an iconic choreography of the 20th century: *Lamentation*, a solo piece created by Martha Graham. The analysis will show the applicability of the theory and the adaptability of the model of analysis, and it will also provide examples of the way a new type of annotation based on this grammar has been created and applied using the ELAN annotation software. The use of ELAN includes the implementation of a specifically compiled controlled vocabulary providing labels for coding the materiality, structure, and semantics of dance discourse systematically.

KEYWORDS

Functional Grammar of Dance, Kinesemiotics, projection, space, dance discourse, *move*, Minimal Ballet Sequence, costume

Introduction

In January 1930, an iconic modern dance solo created by Martha Graham (one of the great founders and pioneers of western modern dance), *Lamentation*, was first performed in New York. Graham described it as "a solo piece in which I wear a long tube of material to indicate the tragedy that obsesses the body, the ability to stretch inside your own skin, to witness and test the perimeters and boundaries of grief, which is honorable and universal" (Graham, 1991, p. 117) (see Figure 1)[1]. The piece became a foundational

1 The media frame is from the *Lamentation* performed by Peggy Lyman (1976) who was principal dancer with the Martha Graham Dance Company. This is the version of *Lamentation* we used for the analysis and all the media frames included in the present paper are from this version (Available from https://www.youtube.com/watch?v=Dn7lGuROMxQ, last accessed 01 July, 2022). For copyright reasons, all the media frames included in the paper are blurred.

FIGURE 1
The costume in *Lamentation*.

example of modern dance and movement experimentation with costume materials, another important practice-based research area in which Graham was a pioneer throughout her career. The main aim of this article is precisely to test "the perimeters and boundaries" of the Functional Grammar of Dance movement (FGD) (Maiorani, 2017, 2021a), which informs our previous work on the analysis of movement-based communication in ballet performance, and which we would like to test further in its principles and in its potential to capture how movement-based communication can also happen through the interaction between choreographed movement and costume materials. The ultimate aim of this paper is to show that the FGD can not only be applied to the analysis of how dancers (and artists in general who practice movement-based communication) communicate and interpret a role through the way their moving bodies interact with a performance space, but that it can also be applied to research on how this type of communication can be enacted even in the absence of movement *across* space. This will show the usefulness of the central FGD notion of *projection* even in the case of analysis that is performed on very restricted movement. The analysis of *Lamentation* that we are going to perform will show how the famous tube of stretchy material that constrains the dancer's movement in *Lamentation* actually provides a three-dimensional quality to a choreography that is mostly designed on a bidimensional plane of horizontal and vertical lines, much more typical of the still representations that viewers experience when looking at paintings and pictures even in the presence of linear perspective.

Abbreviations: A, Agent; POS, Participant/s on stage (characters and items); AU, Audience; GR, ground; TP, top; RS, stage right side; LS, stage left side; BG, stage background; FR, stage front; RFC, right front corner; RBC, right back corner; LFC, left front corner; LBC, left back corner.

The FGD and the development of Kinesemiotics

The FGD (Maiorani, 2017, 2021a) was created drawing on M.A.K Halliday's Functional Grammar (Halliday and Matthiessen, 2013) for verbal language, and Multimodal Discourse Analysis (Kress and Van Leeuwen, 2006; Kress, 2009; O'Toole, 2011; Bateman et al., 2017; Bateman, 2019) to meet the challenge of finding a method of analysis for movement-based communication. It is a model that could be used by scholars from different disciplines to understand and analyse systematically how communication can happen through the interaction between body and space, without having to use complicated notation systems that require specialist training. The use of the FGD only requires a basic knowledge of the principles of Systemic Functional Linguistics theory (see below), which are widely known in most research communities focusing on communication; no special training in annotation is required. The ultimate aim of the FGD is to provide a framework for understanding meaning created through a movement-based performance that can be easily adapted to different contexts, and that can be flexibly used in manual analysis as well as in research involving digital movement capture and software creation for creative, archival, and pedagogical use. The FGD is also meant to elicit and enhance interdisciplinarity: it is not an alternative to traditional notation systems (i.e., Labanotation or Benesh notation) which focus on physical movement and its qualities, and it is not an alternative to videorecording as it is not dependent on a viewer's or camera's point of view. All data that is collected through the use of the FGD has the dancer/performer as its center and creator of movement *and* meaning. Different dancers may make different choices for the same dance piece and modify a given choreography, thus creating different meanings and not just different movements even if dancing in the same role. Traditional notation systems capture physical movement and its physical qualities: they are movement analysis systems rather than dance analysis systems, where the term "dance" already implies acts of interpretation and communication beyond the physical dimension of movement (see Adshead-Lansdale, 1994, p. 16). They also do not record the semiotic role of a dance performance space and how that space interacts with dance movement when enacting communication (Munjee, 2015; Brandão, 2017). It is precisely on these more communication-oriented aspects of dance analysis that our account focuses: the FGD analyses how meaning is created *through* movement *during* a movement-based performance, and it captures interpretation and dance discourse realisation *in fieri* and from the point of view of the dancer. The analysis we propose in this article follows a long tradition of studies that approach dance as a language drawing on several disciplines and approaching it from several perspectives (see Maiorani, 2021a). These studies have focused on understanding whether any universals can be traced

among different styles, and whether these can be recognised as forming a basic, overarching semiotic system. Starting by comparing dance to verbal communication in order to highlight its differences and specificities (Hanna, 1979; Blacking, 1983), scholars have also advocated a linguistics-based approach to the study of dance and the analysis of choreography that would facilitate the description of movement-based meaning-making processes for students and non-practitioners (Adshead-Lansdale, 1981; Foster, 1986). This trend led to Hutchinson-Guest's (2005) reconsideration of Labanotation itself with the use of grammar concepts and labels borrowed from verbal structural grammar, a fascinating attempt that is however limited to a comparative exercise and does not achieve a systematic description of dance as a semiotic system. With a more distinctive socio-semiotic approach, Williams (1999) compared dancers' bodies to other people's bodies as socio-semiotic constructions. This approach precedes more practice-based studies in kinesthetic empathy that have evolved focusing on the cognitive nature of movement and on an audience's empathic response (Opacic et al., 2009; Reason and Reynolds, 2010). Moreover, by recognizing the gap that exists between the experience of a live dance performance and the data that is made available through its recording and/or annotation, scholars have also tried to figure out whether there would be more effective ways of archiving the complexity of this form of art and communication (Adshead-Lansdale, 1994; Brandstetter and Klein, 2012). More linguistically oriented studies have started considering the application of some concepts of grammar to the way the body is used in dance: they promoted the idea of dance as a system of signs (Bannerman, 2010) and generated a general recognition that if a grammar needs to be considered it needs to be created for being specifically used with dance (Bannerman, 2014; Matluck Brooks and Meglin, 2015; Keevallik, 2018).

Research carried out so far using the FGD is at the core of the development of a new and interdisciplinary area of research called Kinesemiotics, which is aimed at the development of multimodal theory focused on movement-based communication. Kinesemiotics also aims at individuating and potentially developing its practical applications in various domains, including digital elaboration and data archival that may be used for immersive experiences, for supporting enhanced teaching interactive activities, for heritage preservation, etc. As it is being developed through the collaboration with various artists and professional practitioners from the English National Ballet, Kinesemiotics is also oriented towards an enhanced awareness of the way movement-based communication is construed with a positive impact on related activities, for professionals as well as for scholars and non-experts (see interview with professional ENB dancer Junor Souza in Maiorani, 2021a). Even though the FGD draws theoretically on some principles of Systemic Functional Linguistics generated for verbal language analysis, the data collected through its use is not finalised at *translating* dance into verbal language (see Maiorani, 2021a, p. 8). By analyzing how dancers interact with meaningful portions of space, we collect data on what the viewer is offered to experience during a performance, the movement-based discourse on which an audience can then elaborate an interpretation. It is a language-driven approach in that it draws on a theoretical framework that incorporates the non-verbal contextual dimension of a text into verbal realisations, but it works with the ontology of movement-based communication and the materiality of the human body and different types of performance space. This is reflected in the distinction between the *physical space,* which enables dance discourse to develop through movement in the physical environment where it is carried out, and the *contextual space,* which contributes to the meaning of dance discourse by providing meaningful areas for the realisation of *projections* in a performance environment. In the FGD model, these two spaces overlap and enable dance discourse to be realised. The contextual space of a dance performance is populated by people, objects, props, light effects, and any other items that can determine the semiotic salience of different areas. Following the principles of Systemic Functional Linguistics, the FGD is based on the realisation of three types of meanings that account for three main metafunctions that Halliday sees fulfilled by any semiotic system working to enact communication: Experiential, Interpersonal, and Textual. The core principle of the SFL theory is that whenever communication takes place, whatever system is used, the participants in the act of communication mainly engage in three tasks simultaneously: they represent some happening or event that construes human experience, they establish some type of interpersonal relationship, and they do it in a coherent way by building up structures that allow for the communicative act to be realised, human experience to be represented, and human relationships to be established and entertained (see Halliday and Matthiessen, 2013). The socio-cultural as well as physical context in which the act of communication happens is incorporated in the act itself as it determines the choices that the participants make within the meaning potential of the semiotic systems they use in order to make the message as effective and functional as possible. Therefore, each context is defined through three main dimensions that activate three types of meanings: Field, which is the dimension that accounts for the topic of an act of communication and activates the experiential meanings; Tenor, which accounts for the relationships that are created and/or entertained during an act of communication; and Mode, which accounts for the way the act of communication is coherently structured and conveyed. Experiential, interpersonal, and textual meanings are realised simultaneously by co-existing and co-functioning structures in a simple clause, which is the basic unit of analysis. In the FGD these structures are the choreographic affordances available for each choreographer to create a piece of dance. Figure 2 provides an overview of the FGD model.

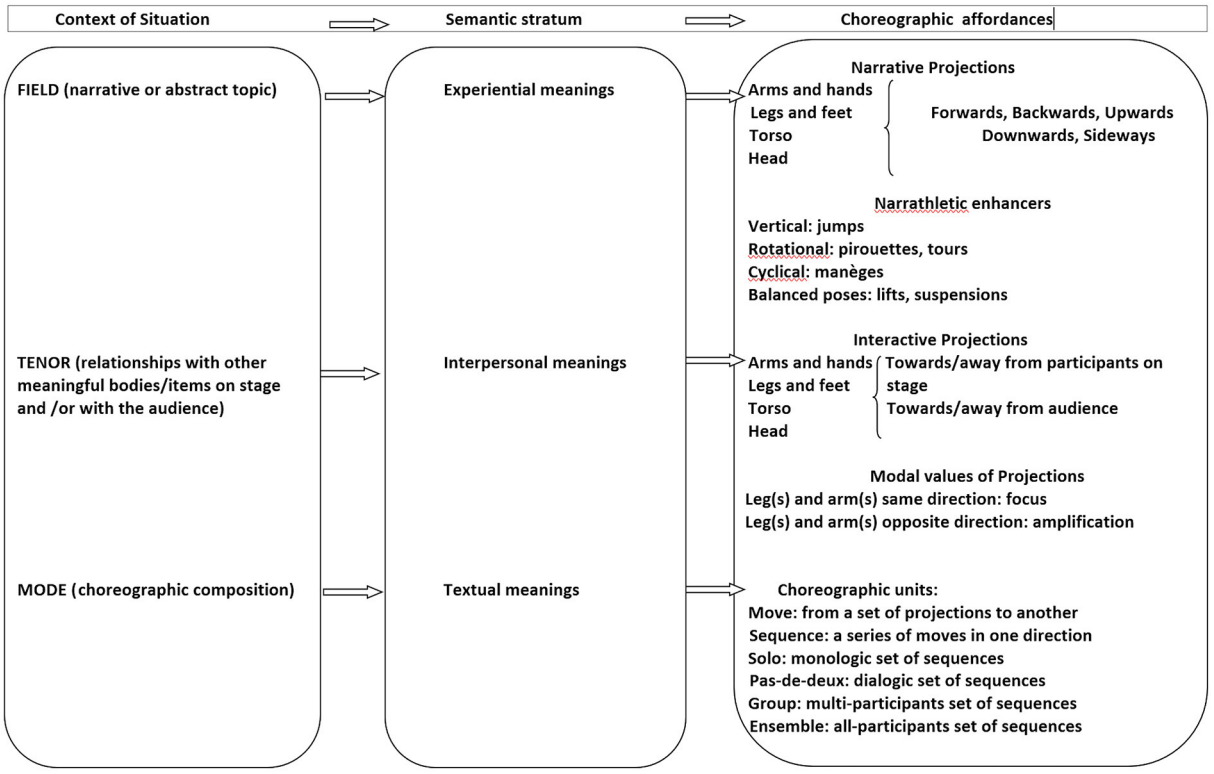

FIGURE 2
The Functional Grammar of Dance movement model (Maiorani, 2021a, p. 30).

The basic unit of analysis of the FGD is the *move,* which is "the smallest structural unit of motivated movement that marks the enactment of projections by separating them through the necessary flow of body parts" (Maiorani, 2021a, p. 34). This notion allows us to incorporate the idea of movement flow across space: a *move* is made by performing physical movement across the physical space and by the interaction of the different dancer's body parts with the contextual space, an interaction that is marked by *projections*. A projection is "the interactive connection between body parts and space that generates movement-based communication" (Maiorani, 2021a, p. 28). Projections capture dynamic processes through which dancers create meanings by performing choreographed movement that interacts with meaningful portions of the contextual space. By marking the sets of projections at the starting and at the arrival point of a *move*, it is possible to define how movement develops across space and to frame the semiotic dynamics of the meaning-making process carried out by dance. In this way, the sets of projections are connected through the displacement across space itself in a specific direction, and the analysis of a *move* cannot be misunderstood for the analysis of static positions.

The FGD distinguishes between two different types of projections that are realised simultaneously: Narrative Projections are meant to express action, interaction, and emotional change; they can be intensified by *narrathletic enhancers* (Maiorani, 2021a, p. 33), movements that accompany the narration with physical virtuosities that are mainly meant to showcase the dancers' technical capabilities. Interactive Projections, on the other hand, signal whether a dancer's body interacts with people and/or items on stage or with the audience. Narrative and interactive projections realise experiential and interpersonal meanings respectively, whereas textual meanings are analysed by looking at Choreographic Units of different sizes, all based on the basic unit of analysis: the *move*. Projections can also be modalised by *focus* or *amplification*: these two Modal values depend on how many body articulators respectively project in the same direction or in different directions. Moreover, projections might also be distinguished in relation to their orientation towards the inner world of the character that a dancer is interpreting or vice versa: *reflective* projections are, therefore, directed towards the body of the dancer who realises them, indicating a focus on the narrative towards the character's personal sphere; *deflective* projections, on the other hand, indicate a focus towards interaction with other characters on stage (see Maiorani et al., in press).

The structural unit above the *move* is the Minimal Ballet Sequence (MBS). The MBS is made by two consecutive *moves*, which is the smallest number of units that can define a trajectory. The MBS defines the syntactic relationship existing between *moves*, providing a more consistent semantic basis for dance discourse analysis. Depending on whether the trajectory of an MBS does or does not maintain the same direction in both *moves*, the syntactic relationship will be continuous or varied, which will impact on more extended dance discourse patterns.

The FGD can be potentially adapted to different types of movement-based performances, and it has been so far applied to test the possibility of automated dance discourse capture (see Maiorani et al., in press). The FGD is also currently employed in a major collaborative research project funded by the Arts and Humanities Research Council in the UK and the Deutsche Forschungsgemeinschaft (German Research Foundation) in Germany[2]. In this article we want to test the strength of its principles by carrying out the analysis of an iconic modern dance choreography where there is no displacement across space.

Lamentation: Data from an iconic dance solo

The data for this paper is a modern dance solo piece, *Lamentation,* choreographed by Martha Graham on the music composed by Zoltán Kodály. The piece premiered at the Maxine Elliott's Theater in New York on January 8, 1930 and was performed by Graham herself. The version we analysed was performed by Peggy Lyman (1976). The piece lasts less than three-and-a-half-minutes and is performed almost entirely with the dancer sitting on a white bench, a choreographic feature which "creates an image of intense isolation and struggle" (Savrami, 2013, p. 35). The soloist is encased and shrouded in a tube of purple jersey which keeps most parts of her body hidden from the audience, except her face, hands, and feet. The rest of the dancer's body can be inferred through the stretches of the cloth that almost always adheres to her. The costume used in this performance is similar to the particular clothes that were documented to be worn at burial ceremonies celebrated in antiquity by several western cultures, for example by the Greeks and the Romans (see Savrami, 2013). Its specifically designed adherent and stretchy tube-like shape allowed Graham to experiment with the effects of stretching materials on the creation and communicative impact of choreography, a type of performance-based research that she carried out throughout her activity as a dancer and choreographer. Graham experimented not only with costumes but also with props and objects that were designed specifically for her work[3].

At the opening of the piece, the dancer sits at the center of a backless bench set on the stage with the long side facing the audience. The piece starts with the dancer shaking her head softly from side to side, her torso bent forward, towards the front of the stage, and her legs set apart towards its opposite sides. Most of the choreography is based on movements that involve the upper part of the body and upper articulators: torso, head, arms, and hands perform structured movements in different directions. Only towards the end of the piece does the dancer briefly stand from her sitting position before returning to a sitting one and closing in a deeply crouched position in the dramatic finale. For almost the entire time, the dancer's hands hold onto the cloth creating various stretching effects and designing geometrical figures through it, which often hide her face to highlight even more the bodily tension that is supposed to express and to trap equally the dancer's/character's pain.

Several scholars have critically analysed this iconic experimental piece and they provided interesting readings and interpretations: for example, Bannerman (1999, p. 16) considers it along with Graham's other creations in the early 1930s', which she describes as related to "the individual's struggle for freedom." Savrami (2013), instead, analyses the types of grief conveyed in *Lamentation* by drawing upon Kübler-Ross (1997) theorised five stages of grieving: denial and isolation, anger, bargaining, depression, and, finally, acceptance. Savrami argues that out of the five stages of grieving proposed by Kübler-Ross, denial and isolation, anger, and acceptance are those expressed in *Lamentation.* Some other interpretations of this piece are based on annotations made using the traditional Labanotation system, which records the deconstructed positions performed by the dancer's body parts and their physical characteristics (see Reynolds, 2002). More recently, Warburton (2018, p. 11) highlighted the universal meaningfulness of this choreography focusing on what the audience's reception of it *could* be: "Graham (1930) is a prime example of the ways choreographers created a dancing body that sought to express the universality of feeling that transcended individual experience. It is a work not about an individual's grief at the loss of a particular person or thing, but about grief as an experience that everybody could (supposedly) recognise."

2 The project is entitled *The Kinesemiotic Body: a pragmatic account of the local discourse organisation of dance* and is being carried out by two research teams: one based at Loughborough University (UK), led by Dr Arianna Maiorani and including Professor Massimiliano Zecca, Dr Russell Lock and Ms Chun Liu; the other based at the University of Bremen (DE), led by Professor John Bateman and including Ms Dayaha Markhabayeva. The project is carried out in collaboration with the artists of the English National Ballet. More details are available here: *Kinesemiotic Body - Universität Bremen (uni-bremen.de)*.

3 Her collaboration with American Japanese artist Isamu Noguchi, for example, produced outstanding stage sets for ballet based on Greek mythological figures.

With our analysis we want to offer something different from what has been proposed so far: not an external point of view or an interpretation based on traditional movement annotations, but a data collection and an analysis that will showcase how the movement-based communication enacted by the dancer performing *Lamentation*–and in particular the interpreter of the version we analysed–creates through the interaction between her body and the contextual space as semiotic material that the audience can interpret. As a matter of fact, the following two sections of this article are going to focus on all the challenges we had to face to annotate and analyse this piece with the FGD, as they all offered important opportunities to develop the FGD model and the theory that supports it, and to improve our expertise in using it and adapting it.

Putting the FGD to work: Our method of analysis and its implementation

The FGD has been so far applied to analyse dance performances that involve movements across space (e.g., Maiorani, 2021a,b; Maiorani et al., in press) in order to capture its materiality, structure, and semantics. Maiorani et al. (in press) have provided a template for annotating dance sequences that are performed through movement across space using ELAN (https://archive.mpi.nl/tla/elan). ELAN is a multifunctional and versatile software developed by the Max Planck Institute for Psycholinguistics at Nijmegen for annotating audio and video materials. The use of the template involves the creation of a rich controlled vocabulary that draws on the FGD and that allows for an easy annotation of movement structures as well as narrative and interactive projections. The annotation is based on segmentations of a dance performance into *moves,* and it also includes a higher level of segmentation into MBSs. All the segments are adjacent, which means that the arrival point of a *move* coincides with the starting point of the following one. ELAN annotation is organised by tiers created by the notator: a tier gathers annotations that code the same element of the data. At *move* level, we created tiers to account for the dancer's physical movements in space, and the realisation of projection structures, narrative projections, *narrathletic enhancers* (if any), interactive projections, and modal values of projections, all in relation to the different body articulators (i.e., arms, hands, legs, feet, torso, and head). At MBS level, one tier was created to code the discursive trajectory constructed by MBSs. This template created for classical ballet can generally be adapted to be applied to any dance sequence of different styles. However, when we started applying it to the analysis of *Lamentation*, we were immediately faced with a fundamental problem: there is no movement across space in this choreography, and we therefore had to delve into the theoretical principles at the core of the FGD to adapt the very notion (and unit of analysis) of *move* to this new analytical challenge. The first questions we asked ourselves were: how do we recognise the boundaries of a *move* if there is no displacement across space? How do we mark the starting and arrival sets of projections that define and distinguish different *moves*? Our first solution was to look at shapes that were created through the costume stretching over the dancer's body, and to segment the piece according to changes in shape. However, we soon realised that this choice would not allow us to segment according to objective, retrievable, and repeatable criteria. The perception of a shape change can be arbitrary and linked to different perceived dimensions like size (which in itself can change according to different parameters like length, height, thickness, width, etc.) or angle width, or slant, or volume, or rotation, or prominence, etc. Moreover, depending on where they sit with respect to the performance space, different members of the audience could perceive shapes and shape changes in different ways. We also considered the case of a non-live experience of the piece (which is what we had by looking at the video recording of Lyman's performance): if an audience watches a performance on recorded video, the camera's point of view may impact on the perception of shapes and shape changes. It mediates the audience's point of view with its own point of view. We also considered that with the dancer sitting on a bench for most of the time, which obviously reduces the mobility and movement range of lower articulators, a focus on shape changes would mean mostly looking at the upper body parts and neglecting the lower articulators. The shapes perceived by the audience during the performance are an *effect* of the discourse enacted by the solo, not a structuring principle. We therefore discarded this solution and focused on the body articulators as they keep on moving even if no movement *across* space is performed. We then decided that we needed to adapt the FGD notion of *move* instead of finding an alternative to it: the *move* incorporates the dancer's point of view on movement that is not subject to the same potential variations as the audience's point of view.

We also needed a principle through which we could use the same notion of *move*, with clear boundaries marked by sets of projections enacted by all the articulators, and which could provide us with segments that we could then use to build bigger units like MBSs. Maintaining the principle of units marked by sets of projections was fundamental as they can capture local variations caused by different choices made by different interpreters. For these reasons, we decided to focus on the dancer's torso as all articulators are attached to it. At first, we thought we could segment the solo according to the overlap of *torso orientation* and *torso direction* (see Maiorani et al., in press): we thought that changes in these two dimensions of torso projections would provide us with clear boundaries for projection sets that would enable us to replace the starting set and arrival set of a *move*. However, while orientation in a *move* does indeed determine the range of projections that the different body articulators can enact within the contextual

space of a performance, the meaning of the discursive event actually depends on the relationship that orientation has with the *direction* of the *move* (see Maiorani et al., in press).

Additionally, *move* direction and *move* orientation do not necessarily overlap. For example, the effect of a dance *move* going "backward" is created by the opposition between *move* direction and *move* orientation: think of a dancer moving in the direction of the right side of a stage but with their articulators oriented towards the left side. If the dancer "turned" and re-oriented the articulators towards the right side while still going in the same direction, the same movement would be then perceived as going "forward." The meaning attached to the perception of a movement "backward" determines the meaning of the projections enacted by the articulators, with the dancer producing a general effect of taking their distance from someone or something as opposed to approaching someone or something when the perception of the movement is "forward." Direction is the dimension of a *move* through which a dancer can trace a discourse trajectory and thus provide us with a way of segmenting also the upper level of MBS. We therefore arrived at the conclusion that segmenting the solo according to changes in torso direction would be the best solution as it would allow us to work on the idea of movement towards a trajectory even in the absence of movement across space. Segmentation based on torso direction is the only way of marking displacement *across* space and trajectory that involve all articulators in the absence of the physical displacement itself. This solution allowed us to adapt the *move* as a unit of analysis and abide by the very structural and semantic principles that define it. We also had to adapt our controlled vocabulary accordingly: for *Lamentation* we use the phrase "connecting to" for torso direction as it incorporates the dynamic idea of movement intention across space in the analysis of projections that are actually performed all in the same location throughout the performance. In a way, this solution echoes the solution offered by Cohn (2013, 2020) in terms of cognitive visual processes enacted when reading a comic strip: the cognitive processes enacted when reading comic strips *imply* the visual flow of narration whereas those enacted when watching a film sequence *involve* the visual flow. Following his *Parallel Interfacing Narrative-Semantics Model (PINS Model)*, defined as "a theory of sequential image processing characterised by an interaction between two representational levels: semantics and narrative structure" (Cohn, 2013, p. 352), Cohn segments the reading process into panels, the already visually defined units through which a narrative is deployed in comics: "most images in visual narratives are created (i.e., drawn) intentionally to belong to a sequence, and readers in turn are tasked with finding the specific cues relevant for that context" (Cohn, 2013, p. 355). This narrative intention echoes the discursive intentionality that is intrinsic to the act of choreographic creation, whether the choreography is based on a more traditional plot or on a more abstract topic. Moreover, in order to explain how the human brain processes narrative connections through structural cues, Cohn identifies "attentional and perceptual processes" (Cohn, 2013, p. 355) that guide the extraction of the most relevant content cues from the context, thus activating information that "may include knowledge about objects and entities (including roles like agents and patients), spatial locations, and events and actions" (Cohn, 2013, p. 352). Comics therefore work on the assumption that readers will be able to infer narrative connections. As Cohn explains, "[i]nferences can be viewed as a process of situation model construction triggered in the absence of information provided overtly" (Cohn, 2021, p. 352). Following the changes in torso direction carried out by the dancer, the audience of *Lamentation* can capture movement intention cues; based on the cues enacted by the body part to which all human articulators are attached– the torso- we can segment this choreography that does not move across space following the principles of the FGD.

Importing and implementing the FGD into ELAN (2022): Our data annotation and analysis

We annotated *Lamentation* using ELAN and adapting the template created by Maiorani et al. (in press) described above. We created similar tiers at *move* level and at MBS level, but we decided not to include tiers for *narrathletic enhancers* and modal values of projections in the analysis visualisation as they are not present in this specific solo. We also created adjacent segments to demonstrate the starting and arrival positions of *moves* and MBSs. The starting point of a segment marks the moment when the torso direction starts to change, whereas the arrival point marks the moment when the direction is finally reached, and another change is about to start. As per traditional *moves* that are carried out across space, the arrival point of each segment corresponds to the starting point of the following one. We coded the arrival point of each *move* and adopted the FGD-derived controlled vocabulary when entering annotation values in the coding process. Regarding the coding of physical projection structures, we coded them in relation to the directions of *moves* as the FGD specifies; note that in this specific solo the directions of *moves* are signalled by the changes of torso directions. As mentioned above, we have also expanded the controlled vocabulary because *Lamentation*, as a piece of modern dance, provides data that is not usually found in traditional ballet, which is what we have mostly annotated so far. For example, when annotating the physical movement of hands, we have created the term "handling/tight" to describe the instance where the dancer's hands are closed in a fist and holding onto the stretching cloth. Figures 3–6 present all the tiers we have created and examples of annotation we have carried out with ELAN. More specifically, Figures 3, 4 show the annotation values of MBS 24 and its constituent *moves*, i.e., *moves* 47 and 48. The

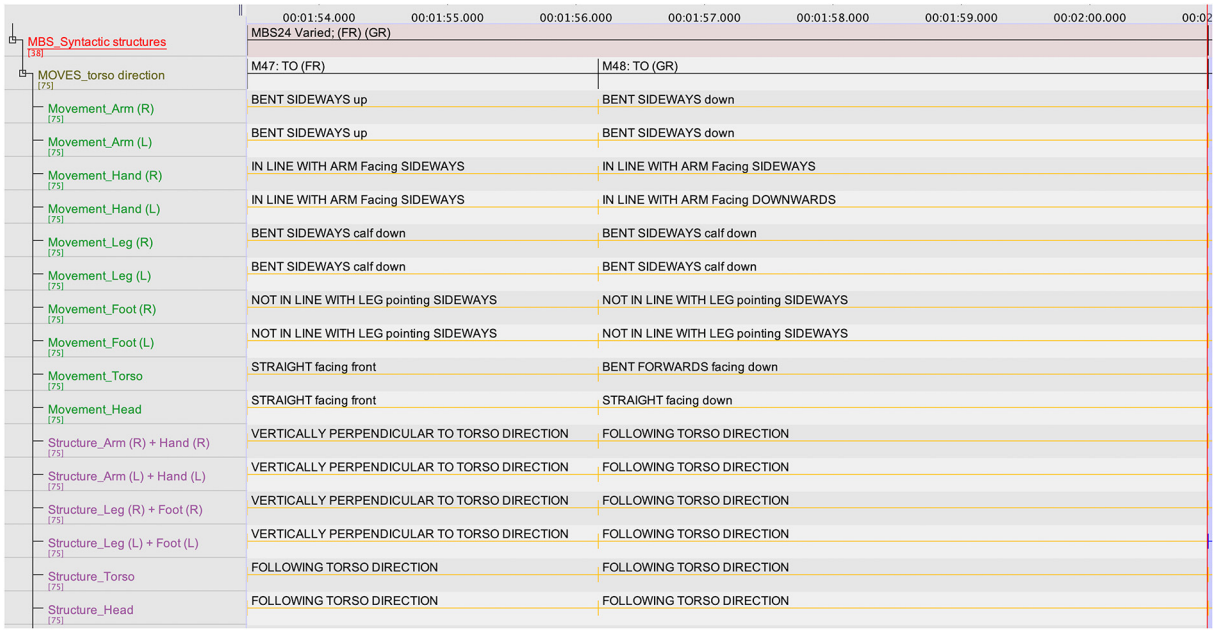

FIGURE 3
The tier at MBS level (MBS 24) and the tiers at *move* level (*moves* 47 and 48) coding physical movements and projection structures.

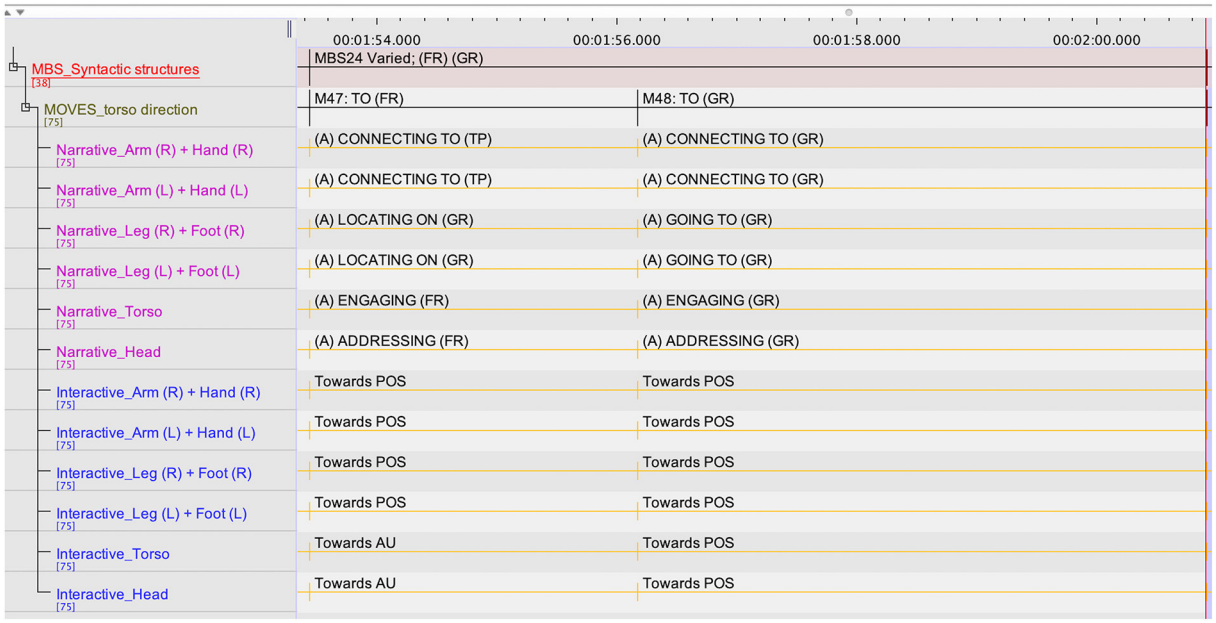

FIGURE 4
The tier at MBS level (MBS 24) and the tiers at *move* level (*moves* 47 and 48) coding narrative and interactive projections.

annotation values of *moves* 47 and 48 code the arrival points of the two *moves,* respectively. The media frames of the arrival points of *moves* 47 and 48 are presented in Figures 5, 6. A list of participants and space values is provided at the end of the article.

Carrying out data segmentation, which involves identifying the starting position and the arrival position of a change in torso direction, was a challenging task as using the FGD repeatedly for the same dance style involves acquiring expertise but also habits. Both coders had to adapt their analytical practice to the

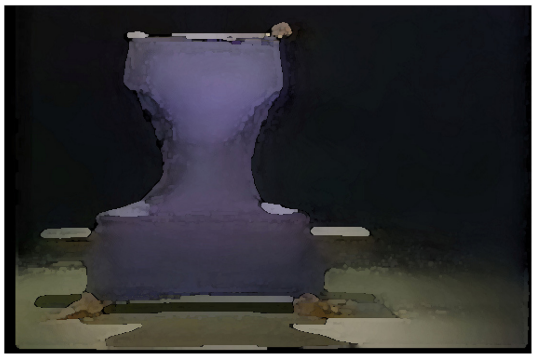

FIGURE 5
The media frame of the arrival point of *move* 47.

FIGURE 6
The media frame of the arrival point of *move* 48.

new parameters and pay attention to the dancer's performance of contraction and release of her solar plexus: this muscular contraction is one of the fundamental principles of Graham's movement technique, and it can give the impression that a change in torso direction is about to start even though there is no such actual change. Addressing these challenges involved sometimes careful repeated viewing by both coders to make sure that the segments aptly capture the changes in torso direction, but it also involved becoming much better acquainted with the specific materiality of this choreography. With respect to segmentation, *Lamentation* also posed another challenge that led to the recognition and creation of yet another possibility of annotation. The piece starts with a long interval where the dancer keeps sitting, facing the audience, and shaking her head, with no change in torso direction. This is not the traditional and relatively static starting position one would expect in a classical ballet. We annotated this interval as a dynamic set of starting projections rather than a *move* as there is no change in torso direction. This starting position is dynamic because it is not realised at a specific static point in time but *over* a period of time. Lastly, during annotation we also encountered technical challenges posed by the mismatch between the annotation values of a *move* and the default media frame displayed by ELAN for the specific segment where the *move* is located. As mentioned earlier, the annotation values we entered code the arrival point of each *move*. However, both in ELAN's Annotation working mode, which is the generic mode for working with annotations in several ways that offer various options in terms of viewing, editing, and searching (see Figure 7), and in ELAN's Transcription working mode, which is designed to enhance the efficiency and speed of data transcription with a keyboard-driven interface (see Figure 8), the default media frame that is visualised is the starting point of the segment. When checking the annotation values by clicking on a segment (for example, in the Grid Viewer of the Annotation working mode which displays the annotation values of all segments from a single tier, as in Figure 7), the framework displayed on the screen gives the impression that the annotation values (coding the arrival point of the *move*) do not match the media frame (showing the starting point of the *move*). Taking *move* 47 as an example again, the media frame that corresponds to the annotation values of *move* 47 (Figures 3, 4) is the one presented in Figure 5 as outlined earlier. However, the default media frame for *move* 47 presented in ELAN is different (see Figures 7, 8) and it does not correspond to the annotation values. This mismatch occurs because the default media frame in ELAN shows the starting point of *move* 47, rather than the arrival point which is what we coded. Such mismatch may lead to confusion and hinder the cross-checking between the annotation values and the media frames. Therefore, when carrying out cross-checks, we needed to make sure that the media frame we looked at was the one that showed the arrival point of the *move*. Currently, we can only do this manually in ELAN: in the Annotation working mode, we play the media and pause it at the arrival point of the *move*; alternatively, we can drag the progress bar and place it to the specific point. In this way, it may be difficult and time consuming to locate the exact frame. It would be helpful if ELAN provided options to display the frame of the arrival point of the segment automatically while presenting its annotation values. We consider identifying this particular limitation of ELAN another result of our research: our solution to operate with the current version and our experience can help other researchers in a similar situation prevent cross-check-related mistakes and adopt a similar solution.

After addressing the challenges mentioned above, we entered annotation values for each segment and double-checked them against their corresponding media frames. Based on the annotation, we conducted a qualitative analysis and quantitative analysis of the data: qualitative results lead to a new insightful reading of the choreographic strategies enacted in this piece, and that can serve as a blueprint for further research, while quantitative results reinforce the emergence of qualitative patterns in the discursive strategy enacted by the piece.

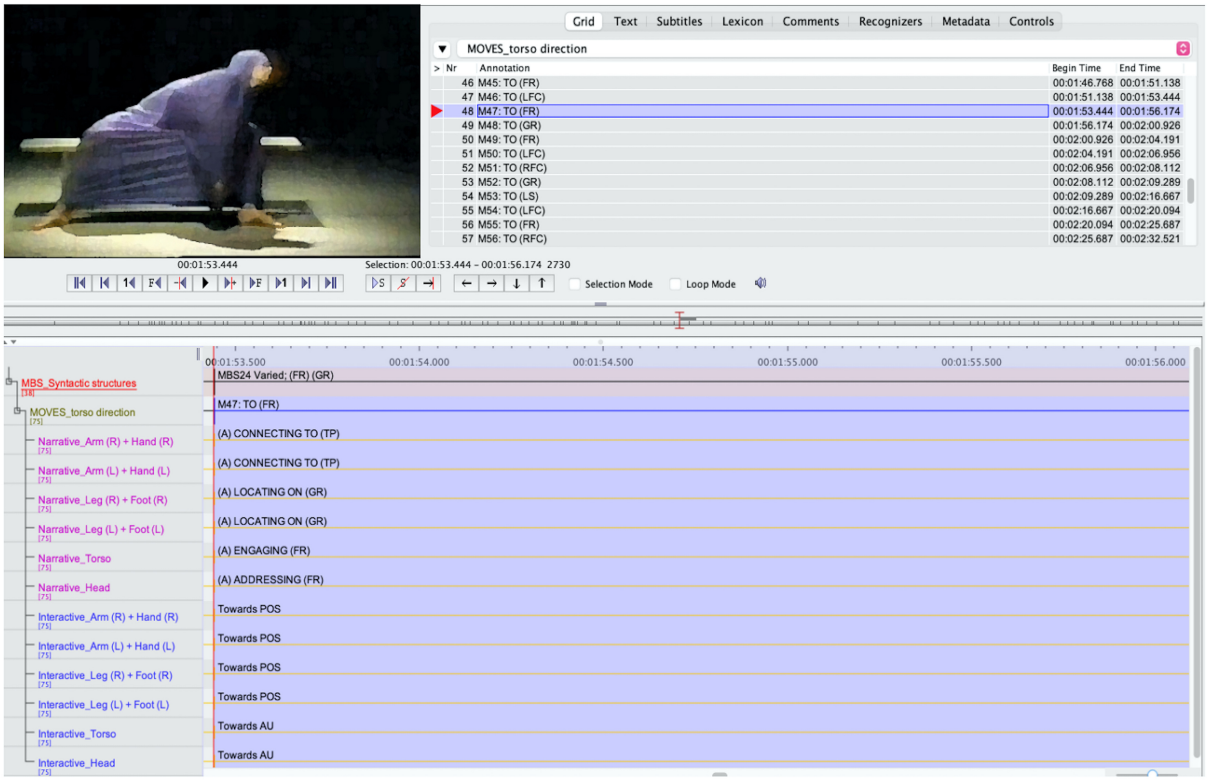

FIGURE 7
ELAN's Annotation working mode and its Grid Viewer (showing *move* 47 and its default media frame).

Discussion of results: An FGD-based interpretation

According to our analysis, the whole piece contains 74 *moves* and 37 MBSs. We will start by discussing our results at the discursive level of MBSs and then address how they relate to the more complex data yielded at *move* level.

What happens at the level of MBS

The direction in each MBS always changes in this specific solo. The default syntactic relationships between *moves* in *Lamentation* is varied because it is precisely the change of *move* direction that signals the occurrence of a new *move* as no other change can mark segmentation due to the absence of movement across space. This finding therefore suggests that the perception of sets of projections in a choreographed piece of dance that does not include movement *across* space is determined by visual cues that *imply* an intention to move towards a direction without actually performing that movement. Dance that does not involve movement across space can be segmented according to the same principles of movement-based communication deployed by the FGD but based on visual cues that impact on the possibility of realising alternation between varied and continuous discursive patterns. This does not mean, however, that achieving other types of variation in discursive patterns is impossible. On the contrary, we found out that by adding a quantitative element to our analysis we could capture that discursive variation that was produced through the alternation of vertically oriented and horizontally oriented MBSs in cycles that become progressively shorter: vertically oriented cycles are realised when torso direction changes in *moves* occur mostly between the top and ground areas of the performance space; horizontally oriented cycles are realised when torso direction changes in *moves* occur mostly between the left and right areas of the performance space. Visually, this discursive pattern suggests the repeated drawing in space of an iconic shape, that of a cross. This cyclical alternation in *Lamentation* deploys as follows:

- MBSs 1–4: horizontally oriented cycle.
- MBSs 5–13: vertically oriented cycle.
- MBSs 14–18 horizontally oriented cycle.
- MBSs 19–26 vertically oriented cycle.
- MBSs 27–30 horizontally oriented cycle.
- MBSs 31–32 vertically oriented cycle.
- MBSs 33–34 horizontally oriented cycle.
- MBSs 35–37 vertically oriented cycle.

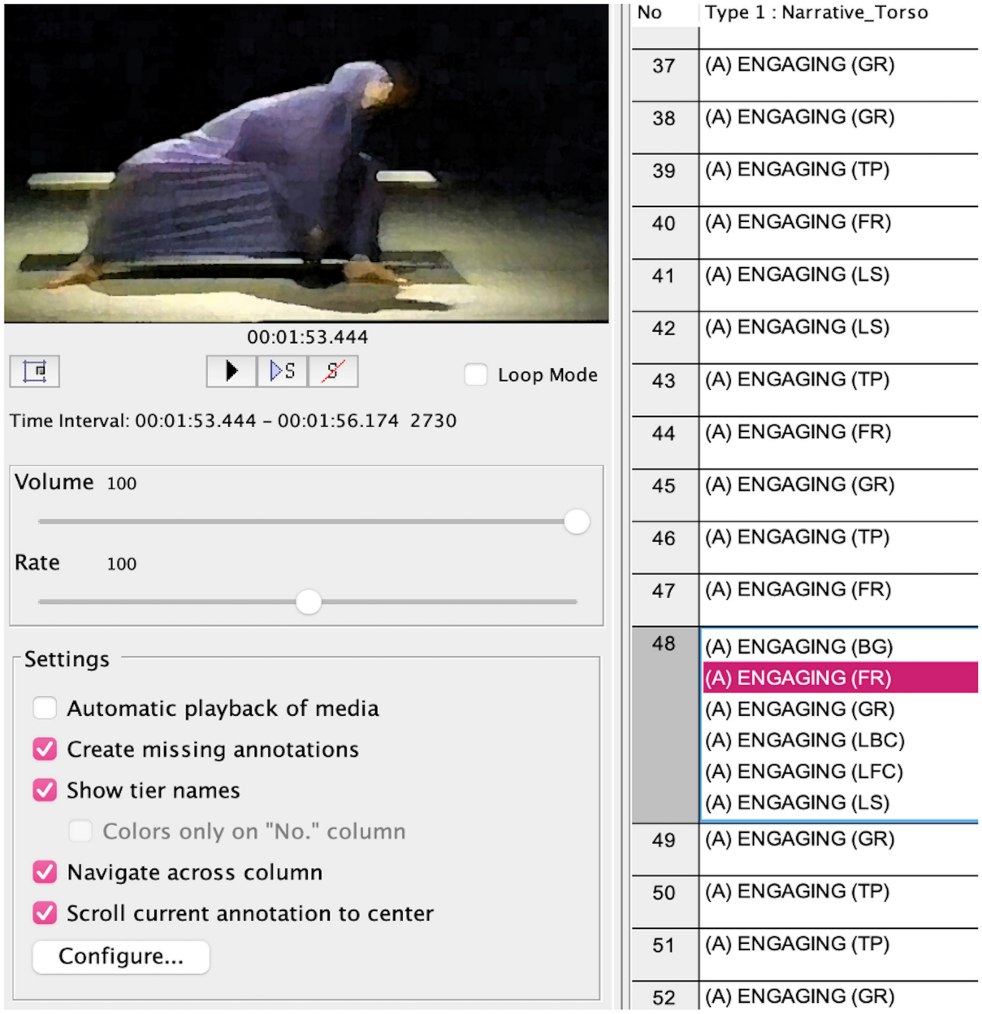

FIGURE 8
ELAN's Transcription working mode (showing *move* 47 and its default media frame).

With progressively fewer MBSs in each cycle, this alternation produces a discursive rhythm that becomes more and more hectic as the piece approaches its dramatic conclusion. The shape of a cross is a powerful symbol across cultures that is frequently associated with pain, grief, religious content, and–most traditionally in western countries–with the "lamentation" of women at the foot of crucified Jesus Christ, traditionally represented in western pictorial art as enshrouded by a dark or purple cloth. This visual pattern matches Graham's fascination for and investigation of Christian figures and cultures, as evidenced also by her personal correspondence and notes (see for example Graham, 1991, p. 199).

What happens at the level of *move*.

At the level of *move*, *Lamentation* offers a very simple scene, with only one dancer who interprets a symbolic character with universal resonances; there is also only one prop, the backless bench on which the character is seated. Lights are only used to highlight the interaction between body and stretchy cloth as effectively as possible, therefore a white light is simply and crudely projected from above onto the dancer. Consequently, both narrative and interactive projections will be directed to areas of the performance space that, like the character, will be charged with widely recognised cultural values, such as "heavens" or "powers above" for the top, "earth" for the ground,

TABLE 1 Narrative projections of arms and hands.

Narrative projections: Arm (right) + Hand (right)		Narrative projections: Arm (left) + Hand (left)	
A connecting to Agent (dancer)	34	A connecting to Agent	43
A connecting to GR	14	A connecting to GR	12
A connecting to TP	12	A connecting to TP	7
A connecting to FR	4	A connecting to LS	4
A connecting to LS	3	A connecting to RS	2
A connecting to LFC	3	A connecting to FR	2
A connecting to RS	2	A connecting to RFC	2
A connecting to RFC	2	A connecting to LFC	2

TABLE 2 Narrative projections of legs and feet.

Narrative projections: Leg (right) + Foot (right)		Narrative projections: Leg (left) + Foot (left)	
A Locating on GR	61	A Locating on GR	62
A Going to GR	8	A Going to GR	9
A Connecting to FR	4	A Connecting to FR	2
A Connecting to GR	1	A Connecting to GR	1

"others" and/or "somewhere else" for the right and left side areas. Narrative projections are therefore directed either to these "values" (deflective) or towards the character herself (reflective), whereas interactive projections will highlight the solitude of a character who can only find a visible interactant in the audience–an interactant that, as data will show, is rarely addressed. The stretchy costume will dramatically mediate all these projections by providing them equally with visual amplification and visual constraints. Narrative and interactive projections realise patterns of local discursive events that can then be collated to the wider discourse patterns realised at MBS level. The analysis performed through the use of the FGD shows a very interesting distribution of realisations of narrative projections by groups of articulators.

Narrative projections

In terms of narrative projections, projections realised by upper and lower articulators show consistently different narrative functions. Arms and hands project reflectively towards the dancer from *move* 1 through *move* 24, with bent arms and hands holding tight onto the stretching cloth, thus focusing the first part of the piece onto the grieving character contracted towards herself. Then projections start moving alternatively towards ground and top, with arms stretching and hands still mostly clutching onto the cloth and/or holding each other. Halfway through the piece, around *move* 40, the oscillation of projections starts involving also the right and left side areas of the performance space. At *move* 50 the left arm starts projecting towards the dancer herself again until at *move* 55 both arms do, marking a redirection of the narrative towards the character. From *move* 56, arms and hands projections start drawing a cross-like pattern again, alternating between top and bottom and right and left side areas of the performance space, until they all project reflectively back to the dancer at *move* 64 to draw the attention to her before the dramatic finale where the left arm and hand keep on holding to her, while the right arm stretches towards the top to then end projecting towards the ground. The quantitative analysis of the data shown in Table 1 confirms the preponderance of reflective narrative projections realised by arms and hands and a good balance between vertically and horizontally oriented narrative projections. This corroborates the results of the qualitative analysis of the data which highlights a major focus on the grieving character in terms of number of projections and the reference to a cross-like shape as a movement motif in terms of projections distribution.

Legs and feet narrative projections mostly have the function to not just ground the piece but locate it to a very small space right at the center of the bench. There are just a few instances around *moves* 15 and 17, 40 and 41, and 49 and 50 when one of the legs briefly projects towards the audience in a quick attempt at leaving the ground that is immediately redressed. In this way a solid base is provided for the narrative enacted by arms and hands that focuses alternatively on the character and on the drawing of a cross-like choreographic pattern. Also in this case, the quantitative analysis of the data corroborates the results of the qualitative analysis in terms of number and distribution of projections, as shown in Table 2.

TABLE 3 Narrative projections of torso and head.

Narrative projections: Torso		Narrative projections: Head	
A engaging GR	38	A addressing GR	26
A engaging FR	12	A addressing TP	19
A engaging TP	11	A addressing LS	11
A engaging LS	6	A addressing RFC	7
A engaging RFC	3	A addressing LFC	4
A engaging LFC	2	A addressing RS	4
A engaging RS	2	A addressing BG	2
—		A addressing FR	1

Torso and head narrative projections are more dynamically distributed, and throughout the piece they alternate projections to the right and left areas of the performance space as well as to the front, top, and ground, with a majority of alternations between front, top, and ground that highlights the isolation of the character who is torn between the "heavens" (perhaps offering hope and/or consolation) and an "earth" (perhaps indicating resignation), and who has nobody around to turn to except the audience. This shows that there is a constant repetition of movement structures drawing a cross-like shape at the core of the choreography and, therefore, at the core of the visual representation that the audience is offered, as well as a profound performative intention to engage the audience directly with the "lamentation." However, while corroborating the data of the qualitative analysis in terms of the design of a cross-like figure, the quantitative analysis shown in Table 3 demonstrates something that might escape the naked eye: it is the torso that projects to the front mostly, whereas the head projects to the front only once. This supports even more an interpretation of the character as being completely isolated in her grief, encapsulated into the stretchy halo created by the costume.

Interactive projections and projection structures

Interactive projections for most of the articulators are mainly directed towards empty spaces, which matches the character's loneliness communicated by narrative projections. However, interactive projections also follow interesting patterns related to the way they are distributed among the various articulators, as shown in Table 4.

Table 4 shows that interactive projections directed towards the audience form clusters around larger groups of *moves* up until two-thirds of the piece, and then they become less frequent and more scattered. Interactive projections towards the audience realised by the torso open and close the piece: this acknowledgment of an audience matches the preponderance of the audience engagement realised through narrative torso projections. Besides, the torso interactively projects towards the audience mostly when MBSs are vertically oriented, thus involving them directly in the dramatic oscillation between the "heavens" and the "earth." Interactive projections towards the audience realised by limbs are by contrast mostly concentrated in the central part of the piece, when there is also an increase in the number of articulators involved. Interestingly, the only time when the head realises an interactive projection towards the audience is in *move* 47, approximately halfway through

TABLE 4 Clusters of *moves* that project towards the audience (AU) and articulators that carry out the projections towards the AU.

Moves that project towards the AU	Articulators that realise the projections towards the AU
Move 11	Torso
Move 13	Leg (right)
Move 15	Leg (left) + foot (left)
Move 16	Torso
Move 17	Leg (left) + foot (left)
Move 20	Torso
Move 21	Torso
Move 26	Torso
Move 27	Torso
Move 39	Torso
Move 40	Arm (right) + hand (right); arm (left) + hand (left)
Move 45	Arm (right) + hand (right); arm (left) + hand (left)
Move 47	Head + torso
Move 49	Leg (right) + foot (right)
Move 50	Leg (right) + foot (right)
Move 51	Arm (right) + hand (right)
Move 55	Leg (left)
Move 64	Torso
Move 71	Torso
Move 73	Torso

TABLE 5 Interactive projections of all articulators.

	Arm (right) + hand (right)	Arm (left) + hand (left)	Leg (right) + foot (right)	Leg (left) + foot (left)	Torso	Head
Toward POS	70	72	70	72	62	73
Toward AU	4	2	4	2	12	1

TABLE 6 Projection structure of all articulators with respect to torso direction.

	Arm (right) + hand (right)	Arm (left) + hand (left)	Leg (right) + foot (right)	Leg (left) + foot (left)	Torso	Head
Vertically perpendicular to torso direction	53	56	57	58	—	13
Horizontally perpendicular to torso direction	4	1	9	1	—	20
Following torso direction	17	15	4	9	74	41
Opposite to torso direction	—	2	4	6	—	—

the piece, reinforced by the same type of interactive projection realised by the torso and marking the central point of the performance like the center where the two axes composing the cross-like shape meet.

Even in the case of interactive projections, the results of the quantitative analysis shown in Table 5 confirm and reinforce the results of the qualitative analysis. Interactive projections are mostly realised towards the empty stage space in various directions and only a minor portion is realised by various articulators towards the audience. Most of the latter are realised by the torso, which consequently takes frontal position on stage, and only one by the head.

Quantitative analysis of projection structures (shown in Table 6) also produced very interesting results about the movement structure of all articulators when projecting, which matches the cross-like discursive pattern shown at the level of MBSs. Most of the projections realised by the limbs are horizontally perpendicular to the torso direction, and most of the projections realised by the head follow the torso direction, which altogether suggests the sustained performance of a cross-like shape that does not appear explicitly in the choreography but that is modularly repeated through projections both at *move* and at MBS level throughout the performance. Moreover, this cross-like shape is realised rather bi-dimensionally, through the constant use of a vertical and a horizontal axis on a plane that is the same as the bench plane. It is the stretchy costume that, by enrobing the body and enshrouding movements, provides it with the abstract volume of a third dimension.

Conclusions

Our analysis of Martha Graham's *Lamentation* in the version danced by Peggy Lyman (1976) allowed us to test the adaptability of the FGD model of analysis, which had previously been used for the analysis of classical ballet, to a very challenging modern dance choreography. The challenge was not only in the change of dance style but also–and mostly–in the fact that this solo is performed without moving across space, which is a fundamental condition for segmenting the choreography into *moves*, the FGD basic units of analysis.

The analysis of *Lamentation* therefore challenged the concepts at the core of the theory that supports the FGD model, and it allowed us to demonstrate that not only is the notion of *move* as the smallest structural unit that marks the enactment of sets of projections within the movement flow a solid one, but also that its theoretical foundation, the relationship between movement and space covered by the human body, holds even when movement *across* space is only implied by the intentional cue of direction, one of the *move's* fundamental dimensions.

Our analysis also highlighted the relationship between the semantic level of *move* and the syntactic level of MBS as determinant to the realisation of specific movement-based discursive patterns, even when the usual possibility of MBS trajectory realisations is constrained by the absence of movement across space. Our work with ELAN using the FGD also allowed us to highlight some limitations of this widely used software that requires improvement, and to offer viable solutions to researchers who might encounter similar challenges. Our discussion demonstrated that the analysis of dance choreography carried out by using the FGD model can indeed produce original qualitative and quantitative data that provides insightful readings and sheds new light even on an iconic piece such as *Lamentation*. In fact, our qualitative analysis allowed us to recognise the realisation of discursive patterns that reproduce a highly charged symbolic shape in western cultures, and that these discursive patterns are generated by projection patterns at the semantic level of *move*. Quantitative analysis supported and corroborated our qualitative analysis, thus showing that the results obtained using the FGD can also benefit from the input of quantitative data.

The analysis of *Lamentation* also allowed us to meet the challenge of addressing an iconic dance piece that experiments with costume and costume material, and to arrive at a re-definition of the relationship between Graham's choreography and the stretchy tube of cloth that is not only based on its dramatic function. In fact, we have provided evidence that the costume used in *Lamentation*, besides evoking a dramatic idea of constraint, also has the fundamental function of visually mediating all projections, thus providing the volume of tridimensionality to the bi-dimensional cross-like shape designed at various levels by the choreography. The costume then becomes the resonance box of a bi-dimensional moving icon.

All these results provide us with more evidence and more motivation to continue our work on the development of the FGD model of analysis and of Kinesemiotics theory by expanding their application towards new areas of movement-based communication.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

The article has been written by AM and CL. AM leading the qualitative analysis. CL leading the implemention of the FGD in ELAN. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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