A narrative review on analysing and reporting research conducted using Talking Mats®, an inclusive communication tool

Hayden, N. K.[1], Bradshaw, J.[2] (corresponding author), Hayward, S. J.[3], Murphy, J.[4], Boa, S.[5], Eden, V.[6], Alm, N.[7], Pampoulou, E.[6], & Mischo, S[8].

[1] School of Education, University of Sheffield, England; iHuman, University of Sheffield, England; Centre for Research in Intellectual and Developmental Disabilities, University of Warwick, England.

[2] Tizard Centre, University of Kent, England. **Corresponding author:** Professor Jill Bradshaw, Tizard Centre, Cornwallis North East, University of Kent, Canterbury, Kent, CT2 7NF, j.bradshaw@kent.ac.uk

[3] Language and Cognition, University College London, England; Oxleas NHS Foundation Trust, England.

[4] Independent Academic, Scotland.

[5] Strathcarron Hospice, Scotland.

[6] Department of Rehabilitation Sciences, Cyprus University of Technology, Cyprus.

[7] School of Science and Engineering, University of Dundee, Scotland.

[8] Department Rehabilitation and Special Education, University of Cologne, Germany.

Abstract

Background: Talking Mats® is a visual communication tool which can support people to express their views. Talking Mats has been used in research as a more inclusive data collection tool, however, analysing the varied data produced by Talking Mats is challenging, and there is a lack of guidance on how to analyse and report these data.

Objective: We sought to provide an overview of ways in which Talking Mats data have been analyzed and reported.

Methods: We conducted a narrative review of studies that reported using Talking Mats to collect empirical data, to examine how these studies analyzed and reported these data.

Results: Studies used qualitative analysis techniques, such as: thematic, content, conversation, and framework analysis. Studies also reported clinical and research case studies and observations of non-verbal communication. Quantitative analyses were used less often, and involved transforming qualitative data into quantitative data (e.g., observing symbol placements). Many studies did not describe their methods in sufficient depth.

Conclusions: We developed the Talking Mats Reporting Criteria to support researchers and practitioners to describe their Talking Mats protocols. These Reporting Criteria were developed iteratively and collaboratively between Talking Mats experts and members of the Talking Mats Research Network. Researchers and practitioners should describe their analytical approach in further detail and report the Talking Mats Effectiveness Framework of Functional Communication.

Key words: Communication support needs, Talking Mats, qualitative and quantitative analysis, inclusive research, methodology.

Introduction

Being able to communicate is an essential feature of being human (1). We are social animals. We communicate to coordinate activities, to think things through, to learn and teach, to express our personalities, and to enjoy ourselves. Vygotsky (2) argued that some of our cognitive abilities originated through interactive speech, therefore the ability to communicate has been a fundamental part of human development. To lack or to be deprived of communication with those around us is a profound problem. If we are unable to communicate with those around us, then we risk being left on the side-lines or feeling invisible (3). An association has been found between having a speech and language related condition and experiencing poorer mental health outcomes. Large-scale population data tells us, for example, that children with speech and language related conditions have higher rates of anxiety and depression than the general population (4). Supporting people with communication difficulties to communicate their views, and supporting practitioners and researchers to *listen* to their views, is therefore important.

Lifelong communication support needs can be as a result of a range of conditions and disabilities, such as intellectual and developmental disabilities. Communication support needs can also be acquired during an individual's lifetime, caused by, for example, strokes, head injuries, progressive neurological disorders, mental health difficulties, emotional difficulties, trauma, and dementia. For people with communication support needs to participate more fully in the world around them, we need to develop techniques and systems that can allow them to interact and to express their ideas and opinions. Communication is a human right (5) and this right to receive and express information and ideas through any mode of communication is enshrined throughout international declarations and conventions (6).

Augmentative and alternative communication

Augmentative and Alternative Communication (AAC) refers to aids, strategies, techniques, and symbols designed to compensate for temporary or permanent support needs in the production or the comprehension of speech (7). The goal of an AAC system is not to find a technical solution to a communication support need, but to enable users to engage successfully in a wide range of interactions and to make their choices and wishes known (7). Individuals can use both unaided and aided forms of communication in order to convey their intended meaning to their communication partners. According to Lloyd and Fuller (8), unaided forms of communication are those where people are able to communicate by using parts of their body. Examples include vocalization, natural speech, gestures and signed communication. Aided forms of communication require the individual to use something additional, such as symbols or voice output communication aids. Talking Mats is an example of an approach that makes use of an aided form of communication.

Talking Mats

Talking Mats is a visual framework (9) that uses aided communication in the form of picture communication symbols (Figure 1) to help people to share their views on a given topic. Typically, a Talking Mats conversation includes a "thinker" who is sharing their views on the topic (often thought of as a "participant" in research or a "patient" in a clinical setting) and a "listener" (often the researcher or practitioner who is collecting information or data using Talking Mats). The "listener" is often the person co-ordinating or facilitating the Talking Mats conversation, and who is listening to the thinker. The terms "listener" and "thinker" are used by Talking Mats to emphasise that the aim of Talking Mats is to facilitate a conversation. Terms like participant-researcher or patient-clinician, on the other hand, can imply a hierarchical and one-sided interaction.

Three types of symbols are used in Talking Mats: First, a topic symbol is used to represent the topic to be discussed, and is placed at the bottom of the mat as a visual reminder.

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The listener will ask an overarching open question to the thinker about the topic to be discussed. Second, the top-scale symbols will be placed at the top of the mat. The top-scale typically represents positive, unsure, and negative views (10). Third, option symbols are presented by the listener, one by one, for the thinker to consider. The listener will use open questions to ask the listener about their views about each option symbol. The thinker will place each of the option symbols under the top-scale symbol that best represents their views. Thinkers are encouraged to add more information about their answers verbally or nonverbally (11). These option symbols are often selected by the researcher before the Talking Mats conversation, often in collaboration with the thinker and those who are in the thinker's social network (e.g., family, friends, support workers, etc.). The thinker will be asked to add their own symbols to the mat as well. There are both original (a physical mat with symbols on laminated cards) and digital versions of Talking Mats. Whether or not a particular Talking Mat represents the views of the thinker can be assessed using specific aspects from the Talking Mats Effectiveness Framework of Functional Communication (12). This assessment is conducted based on the views of the listener, sometimes in collaboration with their colleagues.

The completed mats provide a visual record (12) which, with the thinker's permission, can be used for planning and intervention, for discussion with families, and in research. Along with the symbol placements and verbal information provided by the thinker, observing their multimodal communication is also an important part of a Talking Mats conversation. For example, the listeners may consider the thinkers' body language and non-verbal cues such as: the thinkers' gestures, facial expressions, vocalizations, eye movements, or pauses. These three forms of data (a verbal record, a visual or charted record of symbol placements, and an observation record) may, with appropriate consents, all be included in analyses. For this

reason, many practitioners and researchers choose to video record their Talking Mats interviews, as this supports further analysis and the involvement of collaborators.

[Figure 1 near here]

Studies have reported using Talking Mats in a range of settings such as: the home (13), health and social care (14), the criminal justice system (15), the housing sector (16), education (17), and rehabilitation services (18). Talking Mats is fundamentally a qualitative inquiry drawing on interview techniques. Most studies that have reported using Talking Mats have involved a one-to-one interview between the listener (usually a researcher or practitioner) and the thinker (19). However, studies have also included group interviews/focus groups (20) and dyad interviews (21).

A scoping review (22) outlined the wide range of uses of Talking Mats in research however, there is lack of guidance on how to analyse and report these data. The scoping review (22) however, suggested that existing research studies that have used Talking Mats have not generally described their methods or analysis procedures in sufficient detail. This is a problem. If research does not describe its methods in sufficient detail, then it is not possible to know whether the results are reliable, valid, trustworthy, useful, or ethical. Without clear methods and analysis information, it is not possible to understand or interpret study findings. Methods and analysis procedures should be described in sufficient detail so that they can be replicated by other researchers to test reliability of study findings, and so that researchers and practitioners can learn from one another. Furthermore, Talking Mats is a framework. Facilitating a discussion using a Talking Mat necessitates more than the use of physical resources and involves adhering to certain Talking Mats procedures and principles. Only if researchers and practitioners report their specific Talking Mats approach, can other Talking Mats researchers and practitioners ascertain whether a Talking Mats approach was used at all. The present study therefore sought to conduct a narrative review to answer the following

questions: First, how does existing Talking Mats empirical research analyse and present data generated from Talking Mats? Second, what should authors include when reporting on Talking Mats generated data?

Method

We conducted a narrative literature review to examine our research questions. A narrative review is a non-systematic and non-quantitative method used to summarize the development of a broad area of research (23). Narrative literature reviews are therefore an ideal method to trace how researchers have analyzed and reported Talking Mats generated data over time. Narrative reviews benefit from being more flexible than other forms of reviews, and allow for the addition of author insight and speculation (23), which may be beyond the scope of more systematic review methods. Narrative reviews seek to identify what has already been accomplished in a field, to consolidate this work, and identify omissions (24). This aligns well with our aims to understand and summarise how researchers and practitioners have been analysing and reporting their Talking Mats generated data, and to identify any gaps related to the reporting of Talking Mats generated data.

We believe that this question about how to analyse and report Talking Mats data is of value to practitioners as well as researchers. First, practitioners do not always have access to research methods training, resources, and support, and so this article may be particularly useful at summarising key analysis methods and reporting norms to practitioners. Second, researchers have a great deal to learn from practitioners, and can only understand and replicate the work of practitioners if Talking Mats reports or publications are written in ways that clearly explain the authors' research methods, approach to Talking Mats, and analysis procedures. We have decided not to arbitrarily separate practitioner and academic researcher contributions to the field because many practitioners have dual practitioner-researcher roles,

and authorship often includes multi-disciplinary teams. Furthermore, researchers and practitioners have a shared purpose for employing Talking Mats. In the immediate-term this shared purpose is to gain the views and perspectives of the "thinker" taking part in the Talking Mats facilitated conversation. In a broader sense, practitioners and researchers employing Talking Mats often share a desire to improve the lives and experiences of the people they work with, albeit on a much longer and indirect timeline for researchers.

To identify scientific and grey literature for this narrative review, we searched via the Talking Mats website (where a list of Talking Mats studies has been collated), UCL Explore, PsychInfo, Web of Science, CINAHL PLUS, Scopus, Medline Ovid, PubMed, and Google Scholar. We first included studies that included the term "Talking Mats" in the title and/or abstract. We then established which of these studies had reported using Talking Mats to collect empirical data. Empirical studies that reported using Talking Mats were then examined in further detail, with information about research approach, analysis, and samples extracted. We then selected the most commonly applied analysis methods to include in the narrative review.

Results

In total we identified 101 empirical studies that reported using Talking Mats. These studies were published between 1998 and 2022. Table 1 summarises the samples that took part in the studies that reported using Talking Mats. The three most common disabilities or conditions of those who took part in these studies were intellectual disabilities ($n = 31$), dementia or Alzheimer's ($n = 21$), and developmental disabilities ($n = 20$). Sample sizes ranged from just one participant, to 149 participants. Samples were more often adult ($n = 64$) rather than child samples ($n = 20$). Ten studies reported using the Talking Mats Effectiveness Framework of Functional Communication.

[Table 1 near here]

Studies that have reported using Talking Mats have predominately been analyzed using qualitative approaches. There are, however, examples of quantitative analyses and mixed methods approaches being taken in the Talking Mats literature. In the following sections, we first examined how qualitative analysis techniques have been used in studies that have reported using Talking Mats. Second, we examined mixed methods studies that have transformed qualitative Talking Mats data into quantitative data in order to conduct quantitative analyses or quantitative data reporting techniques.

1. *Talking Mats and qualitative analysis*

The following subsections describe how studies that have reported using Talking Mats have analyzed and presented data using: thematic analysis, content analysis, conversation analysis, framework analysis, case studies, and observations.

Thematic analysis

Thematic analysis is a method for identifying, analysing, and reporting themes within qualitative data (26). Thematic analysis involves the following stages: (i) familiarizing yourself with the data; (ii) generating initial codes; (iii) searching for themes; (iv) reviewing themes; (v) defining and naming themes; and (vi) reporting the findings (Braun & Clarke, 2006). Thematic analysis is often used flexibly and need not conform to a particular theoretical position, technique, or framework. At the simplest level, thematic analysis involves the organization and description of a set of data through the identification of surface, explicit themes. The analysis may go further to involve some degree of interpretation, such as further abstraction of data into global themes or interpretative latent themes (26) which explore the assumptions and ideologies behind the data. Thematic analysis offers insights into

participants' lived experiences and perspectives, such as through examining aspects of health and wellbeing, psychology, and explorations of policy and practice.

Within studies that reported using Talking Mats, thematic analysis has been used to analyse both interview and focus group data. Some studies explicitly reference employing thematic analysis (27), whereas other studies organize their findings thematically, implying that they are drawing on a thematic analytical approach (28). Howard et al., (27) explored the experiences of young people who had accessed communication assistance in the New Zealand youth justice system, and their families. The authors reported that audio recorded semi-structured interviews were augmented using Talking Mats. A submat exploring what was helpful or unhelpful about the support the young person received was used to generate further conversation around the topic. The analysis followed Braun and Clarke's (26) six stage procedure and generated a main theme and seven sub-themes. The level of analysis aimed to remain close to what the thinkers reported. This lower level of analysis was described as "giving voice" to a marginalized group of participants by using their own words to describe themes in the data. Braun and Clarke (26) argue that this "naïve realist" view of qualitative research obscures the role of the researcher in selecting and presenting narratives from the data.

Murphy (20) reported using Talking Mats to present themes generated from audio recordings of focus groups with people with learning difficulties and people who had experienced strokes. Themes were developed using "progressive thematic analysis" examining not only what was said but including a higher-level analysis of how thinkers developed arguments and negotiated issues. It is worth noting that in Howard et al. (27) and Murphy (20), the data analyzed thematically is secondary to the pictorial representation of the final Talking Mats placement.

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Qualitative content analysis

Overall, qualitative content analysis has been used relatively frequently to analyse textual data in studies that report using Talking Mats. Content analysis benefits from being a flexible approach to analysing and describing data (29), which may particularly suit the varied nature of Talking Mats generated data. Hsieh and Shannon (29) define content analysis as "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (29). Hsieh and Shannon (2005) identified three main approaches to qualitative content analysis: (i) Conventional content analysis which is useful for studies aiming to describe specific phenomenon; (ii) Directed content analysis, which is a deductive approach to content analysis used to "validate or extend conceptually a theoretical framework or theory" (29); and (iii) Summative content analysis, which focuses on the meaning of words and the content, which may include as an initial step, quantifying words or content, before moving onto interpreting content. Content analysis involves coding textual data and deriving categories from these codes. Themes may or may not be derived from a content analysis.

Lindenschot et al., (30) used a variety of data collection methods. For example, they used semi-structured interviews (without using Talking Mats), they reported using Talking Mats interviews, and auto-driven photo elicitation interviews, closed questions based on information provided by the parental caregiver, use of play, and use of a hand puppet. All of these data forms were analyzed and presented together – so it was not possible to extract Talking Mats generated data separately. Combinations of these approaches were at times used to best suit the individual they were interviewing, and they went on to analyse these data together. They used conventional content analysis for part of their analysis, arguing that this was appropriate because there was little literature about the topic under analysis. The

flexibility of content analysis was also helpful given the multiple data collection methods used in this study.

Lindenschot et al., (30) described a three-stage approach to their content analysis: (i) Coding transcriptions using an open-coding and causation-coding approach (with part of the data double coded); (ii) Codes were then developed into pattern codes, with a narrative description of the data, organized in themes, being produced. For the more in-depth questions, they used a nominal group technique – whereby researchers worked in two teams to independently analyse the data, then reached a consensus with the support of an independent chair; and (iii) Forming pattern codes across their three research questions and developing a network display (i.e., a visual representation) of these data – consensus was gained amongst the research team. Findings were organized under research questions and then categories, with direct quotes included as well as diagrams summarizing the data.

Small et al. (31) reported using Talking Mats to interview young people with intellectual disabilities about their social networks. They used content analysis to analyse these data. They interviewed thinkers twice, a year apart, to understand how their social network had changed since their transition from school or college and gathered information from their parents. They also considered how views varied between types of participants (e.g., ethnicity, age, different degrees of intellectual disability). Data were presented across themes, with direct quotes from the Talking Mats interviews included in the analyses.

Conversation analysis

Conversation analysis involves the highly detailed analysis of conversation as a form of social interaction. This approach has been used in the study of naturally occurring, free flowing conversation and for more structured interactions, such as political speeches (32), classroom communication (33), and court proceedings (34). Conversation analysis makes use

of video or audio recorded conversations, from which transcriptions are produced, containing as much information as possible (35). A finely detailed approach to transcription is a characteristic feature of conversation analysis. Typically, a short period of interaction can produce pages of description. As well as recording all vocal behaviour in a conversation, including pauses, laughter, and other vocalisations, methods have been devised with video recordings to annotate the whole repertoire of non-verbal activity which accompanies speech (36). Conversation analysis can be used to elucidate features of communication such as power imbalances (37), breakdowns in communication ((38) and the co-construction of meaning (39).

We identified one study that reported using Talking Mats and conversation analysis. Ferm et al. (21) reported using Talking Mats to conduct dyad interviews between people with Parkinson's disease and their partners who did not have Parkinson's disease. Conversation analysis was applied to the transcripts to examine the co-construction of the couples' perspectives on the support needs of the partner with Parkinson's disease. Ferm et al. (21) paid particularly close analytical attention to how couples negotiated situations where they disagreed with one another, usually when the partner was more negative about the abilities of the person with Parkinson's disease, and the person with Parkinson's disease disagreed with their partner's assessments. They worked through three short examples of disagreements between couples in detail. Example excerpts of the transcript analyzed using conversation analysis were included in the manuscript, and then the authors provided a written narrative of how the example disagreement was negotiated by the couple, line-by-line. Ferm et al. (21) concluded that the visual and structured format of tools such as Talking Mats could help to analyse and clarify divergent views, particularly where one partner was at a communicative disadvantage.

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Framework analysis

Framework analysis is a qualitative analysis approach used in psychology, social policy, and health (40,41). Framework analysis was initially developed by Ritchie and Spencer (42) for social policy and applied social research where there is a need to understand "complex behaviours, needs, systems and cultures" (42). The analysis technique is formed of five main stages: (i) Familiarization; (ii) Identifying a thematic analysis; (iii) Indexing (i.e., coding); (iv) Charting (i.e., framework matrixes); (v) Mapping and Interpretation, which involves defining concepts, mapping phenomena, creating typologies, providing explanations, and developing strategies. Due to the relatively systematic nature of this qualitative technique, it lends itself well to large-scale studies and studies with multiple team members collaborating on the analysis.

We identified one paper that used framework analysis (43). Gore et al. (43) focused on Positive Behavioural Support goal formation for caregivers of children with intellectual and developmental disabilities. Gore et al. (43) reported using Talking Mats to facilitate card selection to identify priority areas of concern for parent caregivers, therefore making this study one of the few that used Talking Mats with non-disabled adults. NVivo software was used to manage and code the data. Gore et al. (43) then derived and described themes, drawing on quotes. They also reported the frequency that specific priorities were reported by the thinkers.

Qualitative case study

A qualitative case study could be used to present both verbal and observation data. The aim of a qualitative case study is to gain a detailed understanding of a complex, elusive phenomenon (44,45). Qualitative case studies, therefore, suit questions regarding how and why specific social phenomena occur (46). The focus is on the phenomenon in its entirety and

case studies are explored in-depth (45). A case can be a person, a social unit (e.g., a family, a residential group), an institution, an organization, or more abstract entities such as an intervention or a theory (45). A distinction is often made in the case study literature between everyday or popular case studies (e.g., journalistic case studies, clinical case reports) and research case studies, which are more methodical, describing their methods with transparency (46).

Qualitative case studies are more of an approach than an analysis method. However, we include the technique here as a way in which Talking Mats researchers[9] can present, organize, and position their findings. Analysing and reporting case studies will often involve drawing on multiple sources of evidence, enhancing or developing theory, building explanations, considering converging and contrasting evidence, pattern matching, playing with data using matrices, and examining rival explanations and alternative perspectives (46).

Early studies that reported using Talking Mats as case studies were usually feature articles in speech and language therapy practice journals (i.e., "everyday" or "popular" case studies; (46). These were often short and informative articles used to share Talking Mats with practitioners, rather than used to examine empirical research questions (47). In more recent years, there have been studies that have reported using Talking Mats that have used research case studies. For example, Bell and Cameron (11) included a case study of a woman with mild intellectual disability. The case study qualitatively described at length the background of the participant/thinker as well as their scores on measures of intelligence and adaptive behaviours. The case study reported using Talking Mats to summarize the thinker's favourite activities and described how the thinker responded to the use of Talking Mats on both the first

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[9] Talking Mats researchers are people who have completed the Talking Mats foundation training and use the Talking Mats tools and principlesframework to collect study data.

and second visit. For example, they described how the listener believed that the thinker's confidence improved during the second visit.

Studies that report using Talking Mats drawing on single case studies have examined the sexual knowledge of an individual with severe learning disabilities and severe communication difficulties (48), and the thoughts and beliefs of an offender with communication difficulties (15). Although most of the studies that reported using Talking Mats and case studies that we identified used single-case design, we did identify one multiple-case design study. Murphy and Boa (19) provided the descriptions of four case studies of individuals who had reportedly taken part in Talking Mats conversations to illustrate how a Talking Mats framework can be used to assist adults with communication difficulties in goal setting. Background information was provided about each thinker, with a description provided about conducting the Talking Mat with each case study participant/thinker, including summaries of what thinkers had verbally expressed. Images were provided of each thinker's final mat placements, with one case study including transcript extracts.

Overall, the majority of published case studies in the Talking Mats literature were more comparable to popular case studies than research case studies, which involve a greater degree of complexity and depth than popular case studies. We did identify one study (49) that was a clearer example of a study employing a qualitative case study research approach. The use of research case studies rather than popular case studies was evidenced by Hagelskjær and colleagues (49) in several ways. For example, they described their analysis procedure in their methods, engaged with a seminal case study research text (46), and showed evidence of drawing on techniques described in a seminal case study research text (46), such as comparing and contrasting case studies. In Hagelskjær et al. (49), participants with communication support needs and "cognitive impairments" following brain injuries were supported, reportedly using Talking Mats, to take part in the Canadian Occupational

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Performance Measure. The authors described an analytical process whereby each thinker was analyzed descriptively as individual case studies, and then these descriptive case studies were compared to one another and sorted into categories, with themes from across the case studies derived and then reported.

Non-verbal activity and communication

The observation of multimodal communication is essential to supplement, or in place of, the content of statements made by a thinker in the context of a Talking Mats conversation. This might for example, include the use of augmentative and alternative forms of communication such as the use of Makaton signs and/or symbols. Researchers and practitioners may consider the non-verbal cues such as, thinkers' gestures, facial expressions, and vocalizations. For example, those analysing Talking Mats may consider the speed of placement of symbols, movement of symbols (representing that the thinker has changed their mind or are ambivalent or confused about a symbol), smiles, laughs, eye movements, pauses, or observable signs of emotion. Analysis should take account of matches and mismatches between verbal and non-verbal activity and communication and between expressed views and symbol placement. It is important to consider the individuals' usual style of communication when making judgements about matches and mismatches. For example, some thinkers may vary their facial expression very little throughout the conversation. Other thinkers may laugh when reporting a difficult experience and placing a symbol on the 'negative' side of the top-scale because they feel nervous or embarrassed. Nevertheless, differences should be explored. Overall, Talking Mats studies tended to report on what was verbally said by thinkers or on symbol placement. Ferm et al., (21), a Talking Mats conversation analysis study, specifically included some additional features in their transcriptions and analysis. They included smiles, pauses, overlapping talk, emphasis on words, the speed of speech, laughing,

the handling and viewing of Talking Mats symbols (including symbols being moved from one top-scale option to another), nodding, and looking at people or objects.

Other studies also added observed data to their transcriptions of Talking Mats interviews. For example, Lindenschot et al., (30) included non-verbal responses such as "eagerness, happiness, eye-blinking, irritability, or looking at parents" (30). Some of these observations are more heavily interpreted than others. For example, happiness is often an interpretation of an observed smile, laugh, or physical display of affection. Small et al. (31) derived information about their participants' relationships by the *way* that participants spoke, for example "they might speak warmly…[and] the order in which they chose specific people/things and the position they placed them in was also resonant of emotional bonds" (31). These three study examples primarily used textual analysis methods of the verbal data, with observations forming just one part of the interpretation of these data.

2. *Talking Mats and quantitative analysis*

This section will describe several examples of how studies that reported using Talking Mats have been quantitatively analyzed and summarized. As Talking Mats is a qualitative data collection method, these more quantitative Talking Mats studies have tended to transform observed or verbal data into quantitative data. In terms of research approach, therefore, we argue that Talking Mats studies analysing quantitative data are mixed methods in nature. Mixed methods research is a useful approach allowing researchers to gain both depth and breadth, to study complex research questions and phenomena (53), and extrapolate nuanced inferences. When transforming one form of data into another (i.e., qualitative data into quantitative data, as in the case of Talking Mats), it is important to integrate the transformed data with the non-transformed data (53). This is important, because "the integration of quantitative and qualitative data can dramatically enhance the value of mixed

methods research" (53: 2135). Integrating quantitative and qualitative data can produce mixed methods research that is "greater than the sum of the parts" (54: 40).

Transforming qualitative data into quantitative data

Quantitative approaches to analysis and presentation of data can be a useful way to summarize Talking Mats option symbol placements. For example, Darvell and Bradshaw (50) reported quantitative data where they had transformed observation data of a photograph of the final mat showing where thinkers placed symbols numerically to create a summary of domains in different areas of the thinkers' lives. This is useful for comparing findings between groups of participants, or for measuring pre- post- results with the same sample, or for understanding findings within a sample. For example, the top-scale could be numbered (e.g., happy = 2, unsure = 1, sad = 0) and then each symbol placed would be transformed into a number from zero to two. If researchers wanted to understand which areas of an intervention or a service were perceived more positively, they might try to understand which symbols had the highest average scores, and which symbols had the lowest average scores, reporting these data using matrices. Alternatively, groups of participants might want to be compared, in which case researchers might decide to sum participant symbol placements, producing a total score, or a mean score of symbol placements. Although we would not suggest running statistical tests on averaged ordinal scores, we do think that averaging symbol placements can be a useful way of identifying high scoring and low scoring symbols across multiple participants (e.g., identifying favourite and least favourite aspects of a care home or an intervention), and to present a large amount of data succinctly (e.g., using matrixes or tabulations).

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Talking Mats Effectiveness Framework of Functional Communication

The Talking Mats Effectiveness Framework of Functional Communication (12,51) is assessed using observation methods[10]. If video-recorded, multiple members of the study team can observe and assess the effectiveness of the Talking Mats conversation. The criteria were developed using communication theory to consider the range of methods that form communication beyond speech, such as: listening, understanding, gestures, vocalizations, eye contact, speech, gestures, facial expressions, and posture. The Talking Mats Effectiveness Framework of Functional Communication assesses the following aspects: Engagement; Thinker's understanding; Listener's understanding of the thinker's views; Whether the thinker is "on-track"; Symmetry and balance between the listener and thinker; Whether the conversation happens in "real time"; and Listener "chill factor" or satisfaction.

These items are assessed on a five-point scale (4 = always; 3 = often; 2 = 50:50; 1 = occasionally; and 0 = never/none) and summed to produce a score out of 28, with higher scores indicating a more effective Talking Mats interaction. A total score of 21 or more (i.e., 75%) is considered to be an effective Talking Mat. Where scores are lower than this, listeners may decide to remove or separate this Talking Mat from the main analysis (whilst of course reporting this clearly). Listeners may also decide to include the Talking Mat – such as if their research questions are methodological in nature, or if they were able to gather observation data from the thinker during the Talking Mat. Listeners can also consider applying the Effectiveness Framework of Functional Communication to a Talking Mat symbol-by-symbol if the overall Talking Mat for a thinker was below 75%. Some Talking Mats may not be considered effective overall, but specific symbol placements may be assessed as effective.

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[10] The following webpage contains a pdf of the Effectiveness Framework of Functional Communication – https://www.talkingmats.com/wp-content/uploads/2014/09/EFFC-2014.pdf

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Where resources permit, it is best practice to have some form of inter-rater assessment of the Talking Mats Effectiveness Framework of Functional Communication.

Across research and in practice, the Talking Mats Effectiveness Framework of Functional Communication provides both a way of questioning and assessing whether we can trust that the information collected represents the views of the participants. It supports the development of the research project and the researchers themselves. It also allows the listener who collected the data (and possibly their colleagues) to reflect on each Talking Mats interaction. This can be a valuable source of self-reflexivity as a researcher and as a practitioner, and it can allow some inter-rater reliability and peer feedback if other colleagues or other researchers also complete the exercise. Overall, we identified only 10 studies that reported using Talking Mats and the Talking Mats Effectiveness Framework of Functional Communication. Given the potential benefits of using the Framework just described, this omission raises questions about why so few studies appear to be using the Framework. The reason may be related to limited resources for study teams, a lack of awareness of the Framework, or perhaps problems related to implementing the Framework.

Discussion

Talking Mats is an exciting and useful resource to support conversations with people with communication support needs. Talking Mats has potential as an inclusive way of collecting study data from groups of people who are often excluded from taking part in research studies. Understanding ways of analysing, understanding, and reporting Talking Mats conversations can support practitioners and researchers to help improve the lives and experiences of disabled people and people with communication support needs. The premise for this study began during the first Talking Mats Research Network meeting, where researcher and practitioner members queried, and continue to query, how best to analyse and

report Talking Mats generated data. Our intention with this article has been to produce a useful and educable narrative review article for both researchers and practitioners who employ Talking Mats in their work.

We identified one existing literature review focused specifically on Talking Mats (22). Stans and colleagues (22) conducted a scoping review with two main aims: first, to provide an overview of Talking Mats studies (i.e., objectives, participants, settings), and second, a focus on how studies had reflected on the effectiveness of using Talking Mats. For their second objective, Stans and colleagues, for example, included a focus on studies where participants had taken part in both Talking Mats and another method, and summarised how studies had reflected on their processes. They highlighted that studies reflected favourably on the ways in which Talking Mats had facilitated communication and facilitated the involvement of participants. Our study differs from Stans et al. (22), as we focused specifically on the analysis and the reporting of Talking Mats generated data, rather than providing a broad scoping review. Stans and colleagues do briefly comment on study methods and analyses, highlighting consistencies with our findings, that the Talking Mats studies that they reviewed "did not report the qualitative methods and data analyses in detail" (22: np) and that the quantitative studies did not sufficiently report their methods. Stans et al (22) also highlighted that the studies they reviewed did not evidence self-reflexive processes in their published reports. Therefore, there are methodological and reporting improvements that are required in future Talking Mats studies and reporting. In the following sections we draw out some of our key criticisms of the current literature and make suggestions for ways practitioners and researchers can improve their approach to the analysis and reporting of Talking Mats generated data.

TALKING MATS ANALYSIS

Talking Mats and Qualitative Analysis

One of the most common analysis approaches applied to studies that reported using Talking Mats was thematic analysis. However, a clear protocol describing the analysis process is not detailed in most papers. Future research using Talking Mats would benefit from providing full details about their thematic analysis method (including whether and how they combined verbal and non-verbal information). We wrote about how one of the studies that used thematic analysis using Braun and Clarke's (26) procedure described "giving voice" to a marginalized group of participants. This position is considered by Braun and Clarke (26) to be a "naïve realist" view, as it obscures the role of the researcher in selecting and presenting narratives from the data. This lack of engagement with some of these more conceptual underpinnings and principles of methodologies and analysis approaches was seen throughout the Talking Mats literature. Thematic analysis can be particularly useful for analysing Talking Mats data where there are multiple participants that provide large amounts of verbal data, and the researchers are interested in establishing higher level themes across participants. Where little verbal data is collected from participants, as is possible when conducting research with people with communication support needs, it may be challenging to conduct thematic analysis and derive higher level themes. Therefore, researchers and practitioners should be prepared to adapt their analysis plans once they have collected their data.

Qualitative content analysis was also commonly used by studies that reported using Talking Mats. It benefits from being flexible which suits the varied nature of Talking Mats generated data, along with the complex multi-method data collection approaches often taken by studies that reported using Talking Mats. Content analysis also is flexible in its ability to derive more descriptive categories, or to establish more conceptual themes, depending on the data collected (for example, it may be difficult to derive themes from thinkers who use few words in their Talking Mats conversations). Therefore, qualitative content analysis may be

particularly useful again when researchers are interested in understanding views across participants, but also where there may be more variation in the type of data collected (e.g., less verbal data from some participants).

Overall, we identified one conversation analysis study that reportedly used Talking Mats to examine conversations between people with Parkinson's disease and their partners. This study reported a novel approach to collecting data using Talking Mats (i.e., dyad interviews), as well as an analysis approach that may have scope to support future understanding of Talking Mats. Conversation analysis is used to provide a highly detailed description of interactions, and this may help us to further understand how Talking Mats work. Conversation analysis may also help us to further understand how participants with communication difficulties take part in conversations and what we can do, as practitioners and researchers, to better understand our participants' views.

We also only identified one study that reported using framework analysis. Framework analysis benefits from being a relatively structured and systematic approach to qualitative analysis, which would work well for researchers analysing large amounts of data and studies where multiple team members are conducting analyses. Therefore, framework analysis would be particularly useful for Talking Mats studies seeking to evaluate services or seeking to influence policy.

Case studies were commonly used in studies that reported using Talking Mats. Most of the case study examples discussed were of single, individual case studies, that were more comparable in depth and complexity to popular case studies rather than research case studies. Popular cases are often useful for practitioners and for developing lesser-known evidence bases. However, popular case studies lack the robustness, conceptual-ness, and rigour of research case studies. In the future, Talking Mats researchers using case studies should seek to

draw on guidance from the research case study literature (46) in order to further conceptualise and develop their case studies.

Thematic, content, conversation, and framework analysis are primarily analysis techniques of textual data (e.g., verbal transcripts, observation writings). Existing studies that reported using Talking Mats have tended to focus more on symbol placements and what thinkers said verbally in their analyses. It would be interesting for researchers to include more observation data in their studies, where relevant. A practical requirement of extracting observed data from Talking Mats interviews is video recording interviews and ensuring that the necessary permissions are in place to allow video recording.

Talking Mats and Quantitative Analysis

We identified several studies that reported using Talking Mats and presented the data quantitatively. We described these as mixed methods studies, because qualitative data (e.g., observations of symbol placements) were transformed into quantitative data. This was a useful way of summarizing vast amounts of data succinctly. Overall, it would be useful for Talking Mats researchers to familiarize themselves with mixed methods approaches to the integration of qualitative and quantitative data (e.g., the use of matrices) (52). We also identified studies that had used Talking Mats tools to administer and corroborate questionnaires. However, many of these types of studies did not use open questions, a key requirement highlighted in Talking Mats training. Another challenge with analysing Talking Mats data quantitatively, is that data among participants is likely to vary a great deal. The strength of Talking Mats is its flexibility. We can remove the midpoint top-scale for thinkers who need extra support with comprehension or create five top-scale options for thinkers who place items with more nuance. We can remove option symbols for thinkers who have less concentration and add option symbols suggested by thinkers. However, this flexibility leads to

variation in how much data we can collect for each thinker and often results in missing data, especially when working with a heterogeneous group of thinkers. This issue can make running statistical analyses and converting qualitative data into quantitative data challenging, and, at times, impossible. Overall, the flexibility of administering Talking Mats is a great strength. Researchers and practitioners therefore need to adopt flexible and open approaches to analysing Talking Mats data, to meet the flexibility of the Talking Mats data collection method itself.

Study Limitations

We included examples of Talking Mats analyses from studies that did not fully describe their methods, and so it was unclear whether these studies had conducted a study adhering to Talking Mats principles or not. Nonetheless, we hope that the inclusion of these studies will help orient readers to the potential of different ways to analyse Talking Mats generated data. Most studies also did not report their analysis protocols in sufficient detail, and so this has limited the extent to which we have been able to describe and discuss the way these studies analyzed and reported their data. There are also some limitations associated with our review method. The flexibility and non-systematic nature of narrative reviews means that they are open to biases, for example, there is a risk that relevant studies have not been included in this narrative review.

Directions for Future Research

As described, we argue that Talking Mats studies are qualitative or mixed methods in nature. Those Talking Mats studies that analyse and report data quantitatively have transformed these data from qualitatively collected Talking Mats data (i.e., observations, symbol placements, verbal data). An important component of mixed methods studies is to not

simply include quantitative and qualitative data, but to sufficiently integrate and synthesize these data, arguably creating a third research paradigm. Future research should consider how quantitative and qualitative data can be effectively integrated and synthesized in Talking Mats research (52). We also found that few studies employed the Talking Mats Effectiveness Framework of Functional Communication. Further empirical work should be conducted to try and understand the acceptability, the barriers, and the facilitators of the use of the Talking Mats Effectiveness Framework of Functional Communication among Talking Mats researchers and practitioners.

There are aspects of Talking Mats that we may be able to understand further from a methodological perspective by using conversation analysis. For example, conversation analysis could be used to help us further understand the sense that Talking Mats reifies elements of a conversation by representing these elements pictorially, for example, by use of option, top-scale, and option symbols. Conversation analysis could also be used to help us understand the perceived removal of some of the cognitive and emotional load of carrying out a Talking Mats conversation. For example, we suspect that the listener and thinker being able to sit side by side rather than face to face, with their focus on a Talking Mat, rather than one another diffuses the intensity of the conversation and may make the thinker more relaxed or comfortable. Conversation analysis may help us to examine how these potential facilitators contribute to how Talking Mats work.

For future Talking Mats research, researchers reporting on the use of Talking Mats as a research method for collecting empirical data should ensure that they are reporting all the relevant information. A large proportion of the studies we examined described using a "Talking Mats type approach" or had not reported their Talking Mats methods sufficiently for us to ascertain whether Talking Mats principles had been adhered to. This lack of sufficient methodology reporting also made it difficult to ascertain and therefore summarize how these

studies had conducted their analyses. In response to this problem in the current literature, we have produced the Talking Mats Reporting Criteria to support researchers and practitioners when writing up Talking Mats studies. The Talking Mats Reporting Criteria were developed iteratively and collaboratively between Talking Mats experts and members of the Talking Mats Research Network. Through discussion, members of the authorship team (JB, JM, SB, NKH), including experienced Talking Mats practitioners, researchers, trainers, and developers, produced a first draft of the Talking Mats Reporting Criteria. In our discussions, we considered Talking Mats training materials and content to arrive at a collective understanding of what makes, in essence, a Talking Mats conversation. We identified three key areas to include in our understanding of, and consequent reporting of, Talking Mats: the top scale, the question(s) asked, and the purpose of the Talking Mats. We then shared this draft Talking Mats Reporting Criteria with the Talking Mats Research Network – a group of researchers and practitioners who have completed the Talking Mats Foundation training and who are interested in conducting and developing Talking Mats research[11]. Members of the Talking Mats Research Network then applied the criteria to several studies that had reported using Talking Mats, before discussing and providing feedback on these criteria during an online Network meeting. Four of the authors (JB, JM, SB, NKH) then took this feedback and further clarified and enhanced the Talking Mats Reporting Criteria. In figure 2 we have provided a summary of the Talking Mats Reporting Criteria; this is guidance for practitioners and researchers to use when developing their protocols and reporting on their Talking Mats generated data. We understand that researchers will use the best possible methods to answer their research questions – and this may involve using visual symbols to ask closed questions or administer questionnaires using rating scales. These are valid research approaches. However, these approaches are not Talking Mats (even if the authors use Talking Mats

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[11] All authors of this manuscript are also members of the Talking Mats Research Network.

symbols). Studies should report clearly on these three criteria to allow readers to ascertain whether the study is in fact an example of a Talking Mat. We recommend that researchers and practitioners refer to the Talking Mats Reporting Criteria as a guide for reporting their data generated using Talking Mats. This will help to ensure that readers can ascertain whether key Talking Mats principles were adhered to, and secondly, it would allow for appropriate replication of Talking Mats research.

[Figure 2 near here]

We also encourage future Talking Mats researchers to make use of and report the Talking Mats Effectiveness Framework of Functional Communication. A problem with this framework is that all the items on the measure are given equal weight, whereas one of the most important aspects in terms of being able to trust the data produced by Talking Mats, is arguably the thinkers' understanding. Future research may examine this measure in further detail, suggesting enhancements, or assessing its validity and reliability.

Study Implications

In terms of research implications, we have intended this study to provide a useful orientation for researchers and practitioners about how to analyse and report Talking Mats generated data. This study provides Talking Mats researchers and practitioners with the Talking Mats Reporting Criteria, an overview of how Talking Mats generated data have been analyzed and reported in existing studies that have reported using Talking Mats, as well as ideas for how researchers and practitioners may use these approaches in the future.

This study also has relevance to practitioners and clinicians who use Talking Mats in their practice. The Talking Mats Reporting Criteria emphasize key Talking Mats principles for administering Talking Mats. The examples of how to analyse and report Talking Mats generated data will also have relevance to practitioners seeking to use Talking Mats to, for

example, improve their service, summarize the views of a specific service user or how their views change over time, or to understand and summarize a group of service users' views.

We hope that this narrative review will provide Talking Mats researchers and practitioners with some ideas of ways in which they could analyse their Talking Mats data, ideas about how to report these data, and best practice for how to describe their methods. Talking Mats is an exciting approach to generating meaningful data from people with a range of communication and comprehension support needs. AAC approaches such as Talking Mats are fundamental to conducting inclusive research.

Author contributions. NKH conceived the study. NKH and JB were in charge of overall direction and implementation of the study. SJH conducted the literature searches. JB, JM, SB, and NKH conceptualised the Talking Mats Reporting Criteria. All authors drafted the manuscript and critically reviewed the manuscript.

Ethical considerations. This study, as a narrative review, was exempt from institutional ethical review.

Conflict of Interest. JM is the founder of Talking Mats and holds a voluntary role with Talking Mats as their non-executive director. JB holds a voluntary position with Talking Mats as an honorary research associate. JB, JM, and SB are licenced trainers with Talking Mats. JB

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is a co-investigator on a funded project with Talking Mats. The remaining authors have no

declarations of interest to disclose.

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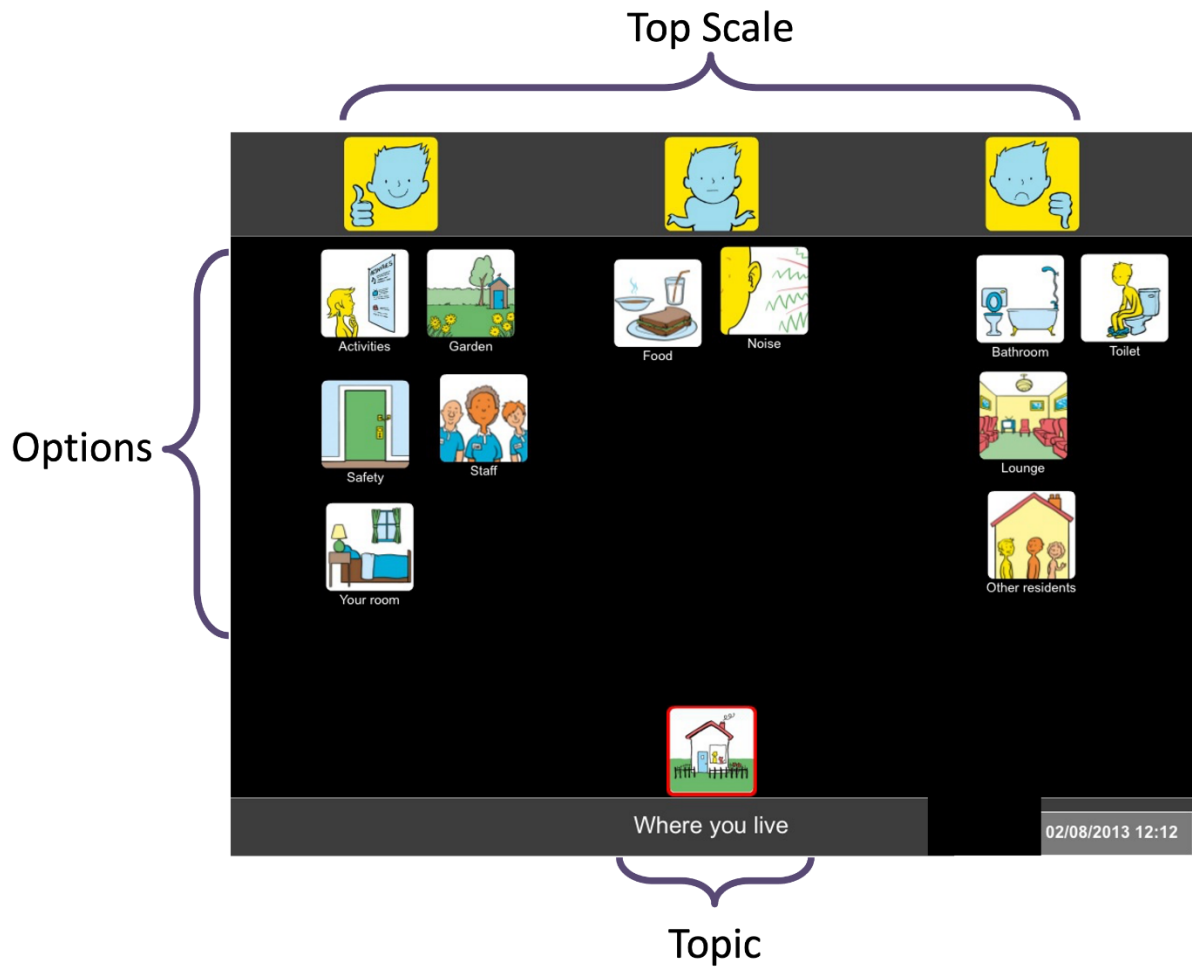
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Talking Mats. 2023. https://www.talkingmats.com/wp-content/uploads/2023/05/Summary-

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Tables

Table 1. Summary of samples that took part in studies that reported using Talking Mats

Total studies reviewed that reported using Talking Mats to collect empirical data *N*	101
Most commonly reported disabilities or conditions of those taking part in Talking Mat interviews:[1]	
Intellectual disabilities *n*	31
Developmental disabilities (e.g., autism, cerebral palsy) *n*	20
Dementia or Alzheimer's *n*	21
No conditions *n*	13
Aphasia *n*	14
Brain injury *n*	6
Age of sample:	
Adult (i.e., aged 18 years and older) *n*	64
Child (i.e., aged 17 years and younger) *n*	20
Both adults and children included in the sample *n*	11
Sample size range	1-149
Reported using the Talking Mats Effectiveness Framework of Functional Communication *n*	10
Note. [1] Several studies had samples with a range of, or multiple, conditions. [2] Details of the papers reviewed can be found at (Hayden et al. 2023) (55).	

Figures

Figure 1. Example Talking Mat

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Figure 2. Talking Mats Reporting Criteria

Talking Mats Reporting Criteria

We have developed the following three (interlinked) criteria for researchers and practitioners to use when designing their protocols for, and reporting on, Talking Mats generated data:

1 IS THE TOP-SCALE CONSISTENT WITH TALKING MATS PRINCIPLES?

The top-scale needs to be described. Thinkers should be able to use the top-scale for reflection when asked an open question relating to a particular option. Studies that fail to describe the top-scale or studies that use a top-scale that is only suitable for responding to closed questions (e.g., a yes and no top-scale) would not meet this reporting criteria.

2 ARE OPEN QUESTIONS USED WITHIN THE TALKING MAT?

To adhere to Talking Mats principles, researchers and practitioners need to evidence that they used open questions by reporting the question used. An example open question is: "How do you feel about x?". Papers that do report using open questions, or report using closed questions, such as questions designed for thinkers to "sort" options into categories, do not meet these criteria.

3 WAS THE PURPOSE OF THE TALKING MAT TO GAIN VIEWS ON A PARTICULAR TOPIC OR ISSUE?

The Talking Mat needs to be used in a way that provides an opportunity for the thinker to give their views about the topic. Of course, thinkers with more complex communication support needs may not provide any additional information about their views, other than placing the symbol. The key is however, that all thinkers are given the opportunity to openly give their views on the topic. There is a difference in purpose according to whether the primary endpoint is asking a thinker to place an item under a category (not a Talking Mat) or whether that placement is used as a potential opportunity for a conversation (a Talking Mat).