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Project title: Evaluating the effectiveness of Talking Mats as a communication resource to enable people with an intellectual disability to express their views on Life Planning
Start date: 1ST October 2001   Finish date:30th September 2004

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Title:
Evaluating the effectiveness of Talking Mats as a communication resource to enable people with an intellectual disability to express their views on Life Planning.

Summary
Talking Mats™ (TM) is an original low tech communication framework developed at the University of Stirling to help people express their views by augmenting their main communication methods (MCM) (Appendix1). It is being used more and more both as a clinical tool and as a research method to obtain the views of people with communication difficulties. Pilot studies indicated a relationship between participants' performance in TM and functional comprehension and this study aimed to establish whether these indications from the pilot studies were valid.

Aims
1. To establish the effectiveness of TM as a communication resource for people with intellectual disability.
 By '**effectiveness**' we mean that people can use TM to express their thoughts and feelings in a way that others can understand.
2. To establish the reliability of TM as a communication resource for people with intellectual and communication disability to express their views.

By '**reliability**' we mean that on another occasion a similar pattern of views are expressed, allowing for changes in life circumstances.

Methodology
The research consisted of four stages:

Stage 1: Selection of an appropriate measure of functional comprehension
In order to ascertain the most appropriate measure of functional comprehension the researchers carried out a review of existing measures and used this as the basis for a focus group with 8 practising Speech and Language Therapists (SLT). The conclusion from the focus group was that no existing measures were ideal[1]. It was agreed that the most useful framework for describing levels of comprehension is the Derbyshire Language Scheme (DLS)[2] which is based on the number of information carrying words (ICW) understood in one sentence. This scheme is widely used but was designed primarily for children. The team subsequently developed an adult appropriate screening test using the same principles. The Stirling Understanding Screening Tool (SUST) identifies 4 levels of functional comprehension and was piloted with 12 people with intellectual and communication disabilities. It was also designed to be used by people with motor control problems. (Appendix 2)

The SUST was used with all the participants in the main project to ascertain their comprehension level. The four levels of comprehension are:

Level 1: comprehending at the single ICW level
Level 2: comprehending at the two ICW level
Level 3: comprehending at three ICW level
Level 4: comprehending at four and more ICW and with the ability to follow more abstract language

Stage 2: Selection of participants
Information about the study was sent to six SLTs, working with adults with learning disability asking them to explain the study to potential participants with the aid of an illustrated information sheet (Appendix 3). During the recruitment process 91 people were approached about whether they wished to take part in the study. Fifty one individuals agreed to participate. A paper on the challenge of obtaining consent from people with a range of intellectual disability has been submitted for publication[3]. The SLTs were also asked to indicate the comprehension level of each participant according to their own knowledge. This process resulted in 48 participants being recruited for the study, 12 participants for each comprehension level.

Table 1 provides demographic information on the participants.

Demographic Information				
Comprehension	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Age				
Mean age	27	25	24	27
Gender				
Male	6	4	5	7
Female	6	8	7	5
Residential setting				
Family home	6	7	9	2
Supported accommodation	6	5	3	10
Main communication method				
Speech	4	8	11	9
Signing	4	2	1	-
Low-tech AAC	2	1	-	2
High-tech AAC	-	1	-	1
Non-verbal	2	-	-	-

Stage 3: Identification of life planning topics and interviewing participants
A focus group was held with six people with intellectual disability from an advocacy group with the aim of identifying the most relevant life planning topics for people with intellectual disability[4,5]. The WHO-ICF domains[6] together with findings from previous AAC Unit research[7] formed the basis of the focus group discussion and led to the identification of the following 13 topics for this project: Communication, Education/Training, Employment, Health, Household Jobs, Housing, Leisure, Mobility, Money, Relationships, Religion, Self Care and Transport.

All 48 participants were visited on four occasions.
Visit 1: The purpose and process of the study was explained to participants in written, verbal and pictorial form. Care was taken to adapt the information and consent forms to take account of communication difficulties (Appendix 4). Assessment of participants' level of functional comprehension was completed at this visit using the SUST. Comprehension levels obtained from the SUST were compared with information given to the researchers by the participants' SLTs. There was 90% agreement.
Visit 2: The views of participants on life planning issues were obtained using either a) TM or b) MCM without the use of TM. Visits were counterbalanced to ensure that any influences from one type of interview to the other could be identified.
Visit 3: Participants were visited within 2 weeks of visit 2 to carry out the second interview. Both interviews were video recorded and a digital photo was taken of each completed 'mat' as a record of the participant's view of each topic. Each participant was asked both about general life planning topics and a detailed life planning topic of their choice.

Visit 4: To check for reliability a fourth visit took place three months after the third visit to re-interview the participant using TM.

Stage 4: Analysis

A. To measure effectiveness:
i)   The video recordings of both interviews (visits 2 and 3) were analysed using a five point coding framework (Appendix 5) which identified the following points as being indicators of effective communication.

  1. Participant's understanding of issues
  2. Participant's engagement with interviewer
  3. Confidence in articulating views/ placing symbols
  4. Interviewer's understanding of participant's views
  5. Participant's satisfaction with their confirmed views

As there are inherent difficulties when different researchers rate data[8,9] a consensus approach was used in which the researchers viewed the data at the same time and scored their judgements without knowledge of each others' scores. There was 79% agreement and the remaining 21% were discussed until a consensus was reached.
ii)   The time taken for both interviews was recorded and compared.
iii)   The number of topics discussed by each participant was counted.

B. To examine reliability:
    The completed TMs from visit 2/3 and visit 4 were examined to note similarities or changes in the views expressed.

C. To further substantiate the quantitative data the following were examined thematically:
   i)   The patterns of the TMs.
   ii) Participants' comments during TM interview (verbal, nonverbal and via alternative methods of communication) to examine whether they concurred with the views expressed on the mats.
   iii) Views expressed in both interviews (2&3) to compare similarities and differences.
   iv) The number of specific topics chosen by each participant.

Results
The data from the counterbalanced interviews identified no significant influence from interview 2 to interview 3 (see stage 2 visits 2/3).

A. Is TM an effective communication resource for people with different levels of functional communication?

i) Effectiveness Coding Framework. The following figures show the mean score on each indicator for the four groups of participants comparing TM and MCM. The points are plotted with standard error bars, or mean (± 1 SEM). Four participants at level 1 were unable to complete interviews on general topics. Each of these plots

produced statistically significant differences between TM and MCM F(1,40) > 24.3, p < .001

Figure 1: Participant's understanding of issue

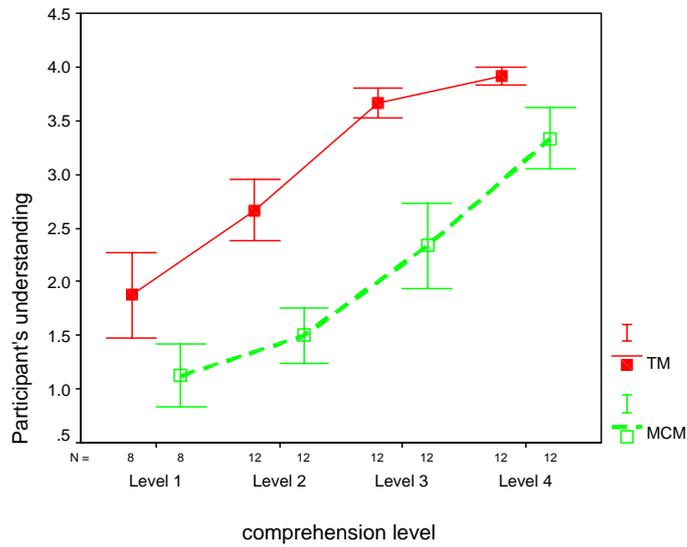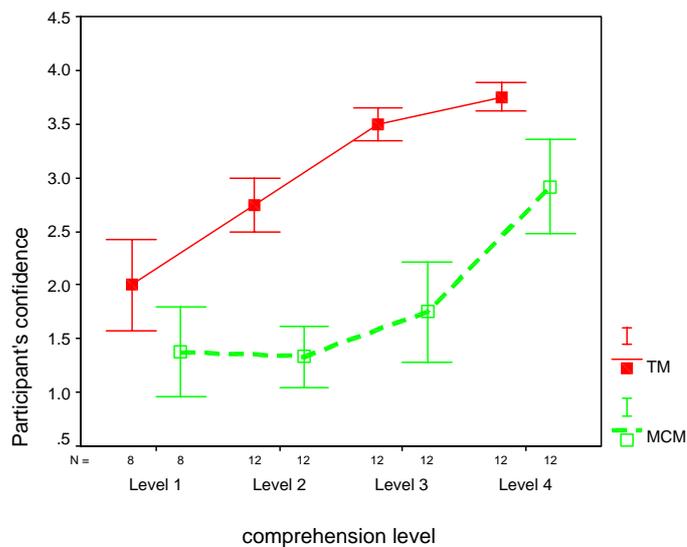*Figure 2: Participant's engagement*
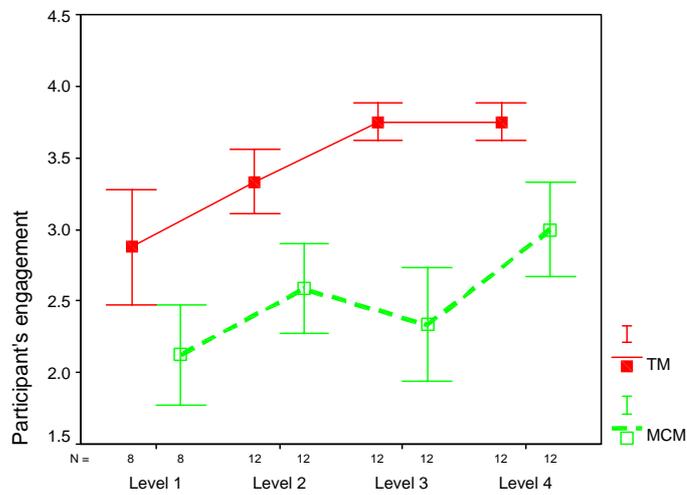
Figure 3: Participant's confidence

Figure 4: Researcher's understanding
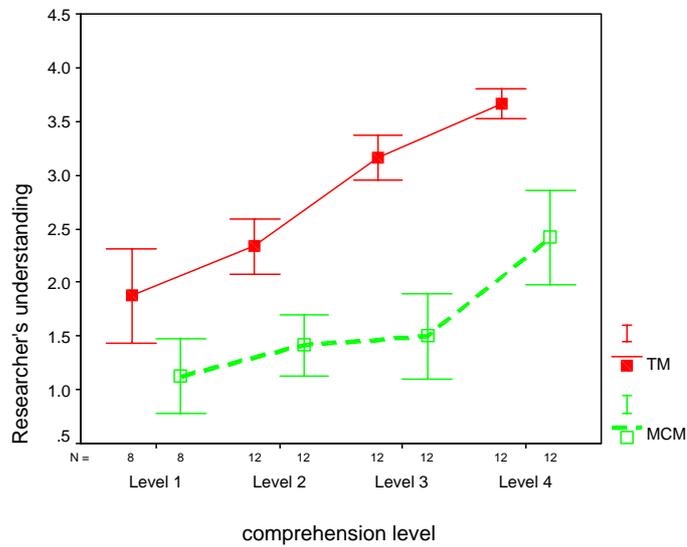
Figure 5: Participant's satisfaction with confirmed views
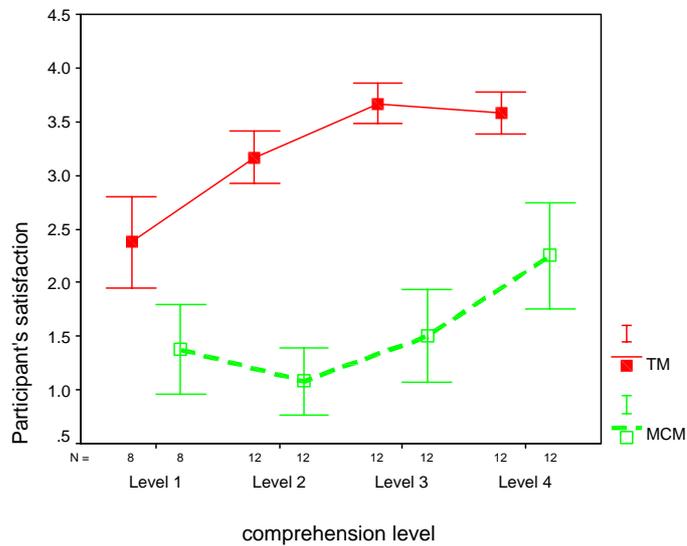
On each of the indicators from the effectiveness coding framework the scores for participants' communication effectiveness was higher when using TM than their MCM. This was the case for participants at all levels of comprehension.

Figure 6: Aggregate score effectiveness coding framework
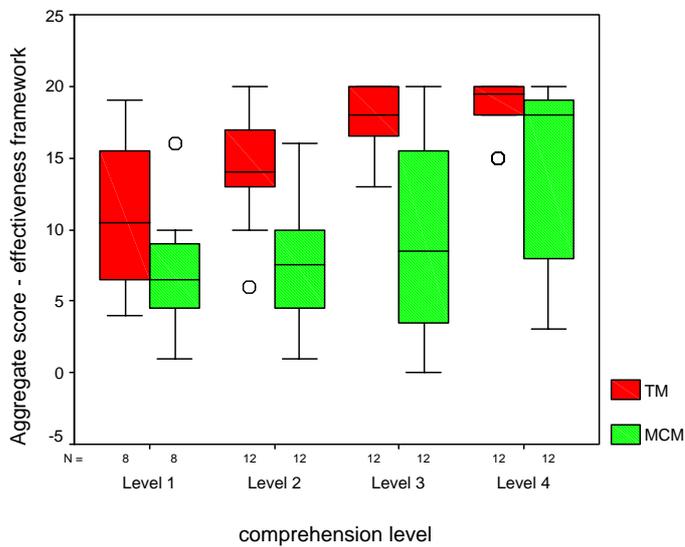
The mean aggregate score for TM was 15.8 compared with 9.8 for MCM, this difference was statistically significant $F(1,40) = 43.6$, $p < .001$. The aggregate scores of effectiveness indicators on both TM and MCM demonstrate that at level 1 the scores are lower and the range is wider indicating a less stable response than at level 4 where the scores are higher and the range is narrower, indicating a direct correlation between comprehension and effective use of TM ($r = .647$, $p < .001$). The same trend was found in the analysis of the interview of the detailed topics.

ii) Time taken

Figure 7: Comparison of time taken to complete TM and MCM on detailed topics
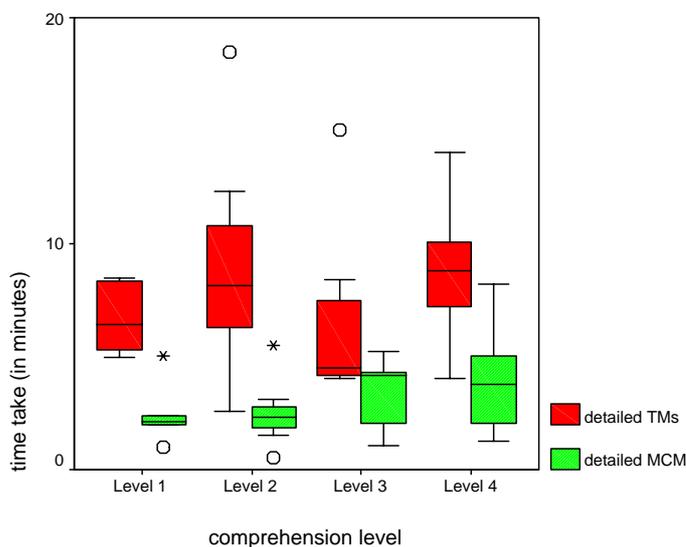
Figure 7 shows that, when expressing views on the detailed topic of their choice, participants at all levels of comprehension interacted for longer. A Wilcoxon test showed that the median times (TM = 7.21, MCM = 2.39 minutes) were statistically significantly different ($z = 4.57$, $p < .001$).

Additional analysis carried out (at no extra cost to the project) by a clinical psychology student using a time series analysis demonstrated increased on-task behaviour when using TM as compared to using their MCM[10.]

iii) Figure 8: Number of topics
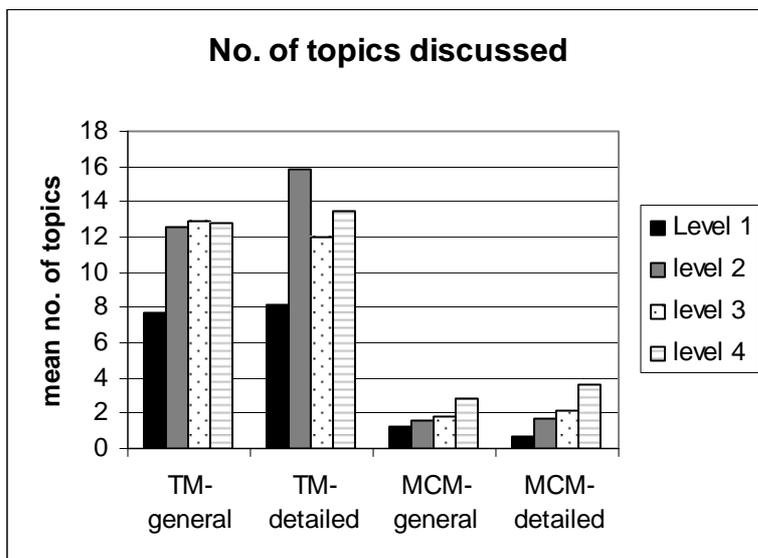
Figure 8 shows that all participants expressed their views on more topics, both at the general and the detailed level when using TM compared to using their MCM. Overall, TM resulted in significantly more topics than MCM $F(1,21) = 227$, $p < .001$.

These findings identify that the effectiveness of Talking Mats™ directly relates to the participant's level of understanding and that using TM to support communication with people with an ID at all levels of functional comprehension improves the quality of their interaction.

B. Is TM a reliable communication resource to examine participants' ability to express their views about Life Planning?

Figure 9: Topics changed at visit 4
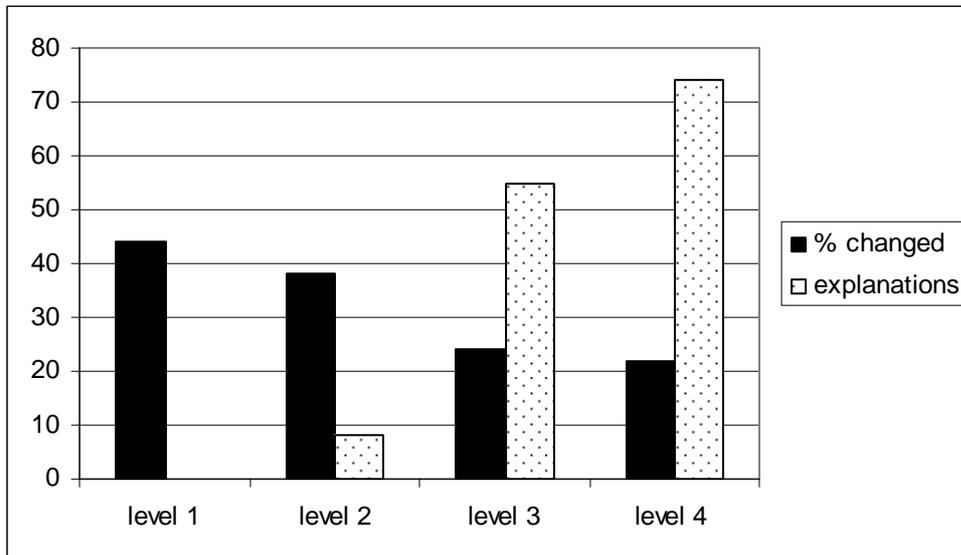
It is inevitable that people's views on life issues will change depending on their situation and life events. Figure 9 shows the percentage of topic changes between visits 2/3 and the final visit, 3 months later, on participants' general TM. Where participants changed their views the researchers endeavoured to ascertain, either from the participant or from their carer, if there were any reasons for the change. For some people it was not possible to determine the reason because they could not explain and there was no carer available to explain.

Therefore the views of participants at level 1 were not reliable whereas those at levels 3 and 4 were increasingly reliable. Reliability of participants' views at level 2 was variable.
Some explanations for changes were due to immediate circumstances:
Participant (47 level 3) moved transport from positive to negative and explained that he had been travel sick that morning.
For participant (5 level 2) money had moved up from negative to positive and explained that he had just "sold stuff ..car boot sale"
Participant (38 level 4) moved communication down and explained that his social worker "does not listen to me about my holiday".

In some cases when one life topic improved, it had knock on effect on others:
Participant (23 level 4) moved house between interviews and at the final visit four main topic areas changed for the better, for example, personal care, people, mobility and health "I feel more settled".

C. Substantiation of quantitative data

i) Patterns:
The pattern of the completed mats of participants showed clear differences in the person's ability to understand the concept of using the mats. The following mats

show the different patterns between 2 participants. The pattern of a participant at level 4 reflects deliberate, clear choices in contrast to a participant at level 1 where the placing of symbols appeared to be poorly considered resulting in a random pattern.

Example of two detailed mats on the topic of leisure:

Level 4 participant (2)   **Level 1 participant (40)**

ii)   Comments

Many of the participants' verbal comments during the TM interviews confirmed their placement of the symbols on the mat. For example, participant 24 (level 2) said '*mouse-not like'* as he placed the **pet** symbol on the negative side of the mat.

iv)   Parallel views

A number of participants expressed similar views in both the TM and the MCM methods. For example participant 38 (level 4) placed *employment* and *leisure* under the 'unsure symbol' at the TM interview. At the MCM interview he said, *'Want a job, can't get a job'; 'I like sport but can't go out on my own'*

From the above findings, 30 participants were identified as being able to use TM effectively and reliably -12 people each from levels 3 and 4, and 6 people from level 2. All these participants achieved a score of 15 and above, out of a possible 20, on the Effectiveness Coding Framework.

iv)Topics

Figure 10: Topics chosen

topic choices

Figure 10 shows the topics chosen by the 30 participants who were able to use TM effectively. All the topics identified at start of the project were selected as detailed topics except *mobility*.

Discussion

This study has identified that people who are able to understand three or more ICWs in a sentence (see methodology)are able to use TM effectively and reliably to express their views on life planning. People who can only understand one ICW are unable to use TM effectively or reliably.

Effectiveness

Participants at level 1

Whilst the views expressed on TM may not be effective for people who can understand only one ICW, there was evidence that the structure provided by TM produced a better performance on all the indicators of effectiveness than when using the participant's MCM only. Using TM also increased the length of time that the interview took and whilst, time in itself is not a sign of quality of interaction, the evidence from the additional time series 'on task/off task' study suggested that the interaction was stronger and more meaningful when using TM.

Finding ways of decreasing distractibility, establishing social closeness and maintaining interaction is crucial to this client group and TM appear to do all of these functions. In addition to TM other methods need to be explored to validate the views of people at level one [11].

Participants at level 2
The findings for people at level 2 are ambiguous, as effective use of TM was indicated for 50% of participants who understood 2 ICWs level. Half of the participants at level 2 appeared to be on the threshold of effectiveness as their engagement and confidence increased as the interview progressed suggesting that using TM is a skill that could be specifically taught. Further research is required to study ways to improve the ability of this group to use TM effectively. See additional factors.

Participants identified as effective users of TM
The findings demonstrate that the views expressed on TM are both richer and clearer than those expressed solely using MCM.

Although the 30 participants who were identified as using Talking Mats™ effectively often had verbal language, signing or alternative communication systems, there was an increase in their communication both in terms of quality and quantity when using TMs. For this group there is often a tendency of staff and carers to over-rely on their existing sytems[12].

There were significantly more topics discussed when using TM than with MCM. This can be explained by the structure of TM which allows a range of topics to be presented via visual symbols in a shared activity which shifts the balance of power towards the participant. When there was limited response during the interviews using the participants' MCM only, the researchers prompted the participants. Without the structured visual support provided by Talking Mats™, the interaction was weighted towards the interviewer and became increasingly imbalanced. TM enhances good

quality responses in an interview by providing the following essential components as described in qualitative research methodology[13]:

- A framework to support open questions
- Information to be considered, presented in small meaningful chunks
- A scaffold to help the interviewer listen to, observe and interpret both verbal and non-verbal information
- Time to provide reflection and review of views
- A structure to allow participants to focus on their internal thoughts and use their MCM as much or as little as they want
- The use of visual symbols to reduce memory demands
- The provision of visual and kinaesthetic feedback by the placement of the symbols on the mat

Reliability
For the 30 participants who could use TM effectively there were explanations for the majority of the changes between visits 2/3 and the final visit.

It is evident that when measuring reliability some changes will occur. TM is a tool to help people express their views at a certain point in time. Any measure of functional communication needs to be viewed, not as static but as an indicator which will change and fluctuate. In this study some changes were due to things that had happened that day and some were longer term. Although not everyone had the communication skills or consistency of carers to explain the changes, reliability of TM correlated positively with comprehension levels. The findings for participants at level 2 are again ambiguous reinforcing the need for further research into this group.

Additional Factors
The following factors influenced communication performance in this study and have implications for all people with intellectual disability:

Physical
- Distractions: e.g. Tannoy systems and interruptions in Day Centres caused significant disturbance especially for participants with startle reflexes.
- Motor control: e.g. Reducing motor demands for the task, such as facilitating eye pointing, may assist people who have difficulty both 'thinking and doing'.
- Visual difficulties affected participants' responses: e.g. By making symbols larger and using black symbols on a yellow background increased the effectiveness of response for one participant.
- Low mood affected participants' responses: e.g. One client was unable to explain negative changes at the final visit because of low mood.
- Medical factors: e.g. The impact of seizures affected the communication of several participants.

Iconicity of topics:
Effective use of TM may be influenced by the degree of iconicity and concreteness of the topics. For example, options relating to **leisure** such as swimming or watching TV are more concrete and easier to represent in symbolic form than options relating

to **health** such as diet or mood. Although the participants were comfortable with the picture communication symbols (PCS)[14] used in the study the researchers are aware of the ongoing debate about the transparency of different symbol sets.

Range of topics
The study also confirms the WHO-ICF as a useful resource for life planning as all topics were pertinent to the lives of the participants. This was demonstrated in the detailed interviews where, on a free choice, twelve of the thirteen topics were chosen by at least one participant. The one topic, mobility, which was not chosen could be considered as part of the transport topic.

New tools:

The boundary between giving support and making decisions for people with a learning disability is fluid and care givers often overstep into the latter [15.] Finding ways for people to be central to their life planning and improve the quality of their decision making is crucial This research has clarified which people can use TM as an effective communication tool.

New ways of assessing a person's functional communication have been developed. The SUST provides a quick screening tool for functional comprehension and the Effectiveness Coding Framework provides a more detailed measure of the effectiveness of a person's interaction.

Conclusions
This study has fulfilled the aims of the original proposal and identified the effectiveness and reliability of TM. For people whose comprehension is at 3 and more ICWs TM has proved to be an effective and reliable communication resource to help them express their views. The quality and quantity of information obtained is significantly greater than when using only their MCM. For those people whose comprehension is at 1 ICW, TM may not reflect their views reliably but it does improve their attention and interaction. For people whose comprehension is at 2 ICWs the findings are tentative and this group deserves further research. The study has identified additional factors which influence the quality of interaction. The combination of TM and the domains described by the WHO-ICF has proved to be a powerful resource to help people with ID express their views on life planning.

Importance to NHS and possible implementation
TM is a low cost, simple, easily available low-tech communication resource. It is used both as a clinical and as a research tool to obtain the views of people with ID. It is already being used by a range of NHS staff to obtain views on topics such as general health, transition, accommodation, healthy eating, mood, activities of daily living, consent to treatment, sexual awareness, friendship, issues of vulnerability, goal setting, and service evaluation.
TM has a significant role to play in addressing the issue of user involvement, access to specialist services and communication highlighted in recent government reports and legislation. E.g. Adults with Incapacity (Scotland 2000) Act,[16] Borders Report (2004)[17]

It has been cited as a '*an innovative advance*' in the recent Health Needs Assessment Report (2004)[18].

The findings from this study will be integrated into the regular training courses on TM which are being requested not only by a range of NHS staff but also by staff in partner agencies e.g. social services and education. This is aiding integrated working.

Future research
- Throughout the whole study the key findings were particularly relevant for people at comprehension level 2, suggesting that with training and attention to the additional factors described, they could use TM effectively and reliably. A proposal is being submitted to investigate this. Consideration could also be given to people with comprehension difficulties at level 2 due to other diagnoses, e.g stroke or head injury.
- Investigate the use of TM as a tool for measuring/ detecting mood in people with intellectual disability – proposal in preparation
- Investigate the effectiveness of TM with children – proposal in preparation
- To develop and pilot a screening tool for obese adults with LD – proposal accepted.

Dissemination
- Findings were presented to participants and carers at a 'Day Out' at MacRobert Arts Centre, University of Stirling [19]
- Published papers: [4,5]
- Papers submitted: [3]
- Papers in preparation: [1, 19,20]
- A paper, poster and workshop were presented at the ISAAC conference in Brazil in October 2004.(previously sent to CSO)
- Workshops are planned for speech and language therapy staff in a number of NHS areas.
- Presentations will be made at other relevant conferences.
- Information will be posted on our Website - www.aacscotland.com

Researcher workers
The study was carried out by Joan Murphy and Lois Cameron, Research Speech and Language Therapists and June Watson, Research Assistant. All stages of the project were carried out according to the original proposal and the study was completed on time.

References:
1. Cameron L and Murphy J (in preparation) He understands everything I say: Issues in the assessment of verbal comprehension of adults with learning disability.
2. Knowles D and Masidlover M (1982) *Derbyshire Language Assessment*, Matlock: Deryshire County Council.
3. Cameron L, Murphy J and Watson J (submitted) The challenge of obtaining consent: the experience of involving with with a range of learning disabilities in a research project, *Journal of Learning Disabilities.*

4. Cameron L, Watson J and Murphy J (2004) Talking Mats™: A focus group tool for people with learning disability. *Communication Matters* 18(1):33-35.
5. Watson J, Cameron L and Murphy J (2003) Don't just make the font bigger: Talking Mats™- a tool for improving consultation with people with a learning disability, *Learning Disability Practice* 6(7):20-23.
6. World Health Organization (2001) *International Classification of Functioning, Disability and Health*, Geneva: World Health Organization.
7. Cameron L and Murphy J (2002) Enabling young people with a learning disability to make choices at a time of transition, *British Journal of Learning Disabilities* 30:105-112.
8. Iacono T, Carter M and Hook J (1998) Identification of Intentional Communication in Students with Severe and Multiple Disabilities *Augmentative and Alternative Communication* 14:102-114.
9. Roulstone S (2001) Consensus and variation between speech and language therapists in the assessment and selection of preschool children for intervention: a body of knowledge or idiosyncratic decisions?, *International Journal of Language and Communication Disorders* 36(3):329-348.
10. Lower R (2004) Evaluating the effectiveness of Talking Mats™ *submitted in part fulfilment of doctorate in Clinical Psychology at the University of Edinburgh*
11. Grove N (2000) See what I mean. *British Institute of learning disabilities /Mencap*
12. Bradshaw J., 2001, Complexity of staff communication and reported level of understanding skills in adults with intellectual disabilities. *Intellectual Disability Research*, 45(3), 233-243.
13. Patton, M.Q. (2002) *Qualitative research and evaluation methods.* London: Sage Publications Ltd p.375
14. The Picture Communication Symbols (PCS) ©1981-2004 Mayer-Johnson Co., P.O. Box 1579, Solana Beach, CA 92075, USA
15. Keywood, K, Fovargue, S. & Flynn, M. (1999) Best practice? Health care decision-making by, with and for adults with learning disabilities. National Development Team, Manchester
16. Adults with Incapacity (Scotland) Act (2000) *Code of Practice* Edinburgh Scottish Executive
17. Investigation into Scottish Borders Council and NHS Borders services for people with learning disabilities (2004) Edinburgh Scottish Executive
18. Health Needs Assessment Report People with Learning Disabilities in Scotland (2004) NHS Health Scotland
19. Watson Cameron and Murphy (in preparation) Talking Mats™ Day Out
20. Murphy J and Cameron L (in preparation) Effectiveness of Talking Mats™

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To be provided by the Finance Department, University of Stirling.

Executive Summary
This study examined the effectiveness and reliability of Talking Mats™, an original augmented communication resource, to enable people with a range of learning and communication disabilities to express their views about important issues in their life. Forty-eight people with intellectual and communication disabilities were involved in the study over a 3-year period.
The study has shown that Talking Mats™ is effective and reliable for people whose comprehension is above the two 'information carrying word' level. For the 15

participants who were not identified as effective users of Talking Mats™ aspects of improved interaction were still found. For the thirty identified as being effective users, Talking Mats™ significantly increased the quality and quantity of information obtained. Additional factors were identified which impact on the quality of communcation. These factors will be particularly important for the group identified as being on the threshold of effectiveness.

This study validates and establishes Talking Mats™ as an effective clinical and research resource for improving communication for adults with an intellectual disability.