Remediation of poor emotion processing in schizophrenia: behavioural and eye movement findings

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MACCS

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### Outline of the Talk

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Visual scan path studies

Mary Phillips, D Freeman - UK

L Williams and E Gordon; Melissa Green; Carmel Loughland and K McCabe - Australia

Adolphs - USA
Control Subject  Deluded Subject

Phillips & David, 1997
Restricted scanning + avoidance of features

CONTROL SUBJECT

(Green et al., 2003
*Psychiatry Research, 119,
271-285)

ANGER

FEAR

DELUDED SCHIZOPHRENIA
SUBJECT
Main Message

Restricted/Extended scan paths (symptoms?)

Avoid Facial Features (no triangle)

Similar pattern seen in relatives/schizotypy
Emotion Recognition Training
**Other training Studies**

**Penn & Combs (2000)** - monetary reinforcement and facial feedback combined = better on facial affect identification (relative to practice alone or each of those conditions alone)

**Silver et al (2003)** - 2-3 days of computer-based training (designed for autistic kids) improved explicit emotion recog and valence judgments
Other training Studies

Wolwer et al (2005) – compared cog remediation with specific affect training, 6 week program. N=28 TAR, N=24 CRt, N=25 TAU. Affect recog improved in TAR but not TAU; CRT does not improve affect recognition

Penn et al (2005) – SCIT (manual based group intervention); 18 weekly, one-hour sessions (but modified for inpatients to five sessions a week for three months) N =7; also includes ToM. Showed changes in TOM but not emotion perception

How is this study different?

Computer based tool
Independent, User-lead
Compared to healthy controls
N=20 medicated out-patients with schizophrenia (9 Male)

N = 20 age and education level matched controls (5 Male)

Micro Expression Training Tool (METT) – Paul Ekman (teaching and practice with feedback)

DV: Pre- and post-training METT assessment (% correct)

DV: non-verbal emotion matching (% correct)
Prior to Training
Emotion Matching Task
METT Assessment

1/15th of a second emotion is displayed
The Training
## The Micro Expression Tool (METT)

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<table>
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<tbody>
<tr>
<td><strong>Pre Training Assessment</strong></td>
<td>F, A, H, S, D, C, Sur x 2 presentations at $\frac{1}{15^{th}}$ second (% correct score calculated)</td>
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<td><strong>Training</strong></td>
<td>4 x videos (each 30 seconds) outlining commonly confused emotions</td>
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<tr>
<td><strong>Practice</strong></td>
<td>F, A, H, S, D, C, Sur x 4 presentations at $\frac{1}{15^{th}}$ sec with <strong>feedback</strong> (right, wrong)</td>
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<td><strong>Review</strong></td>
<td>4 x videos (each 30 seconds) different identities, same emotions</td>
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<tr>
<td><strong>Post Training Assessment</strong></td>
<td>F, A, H, S, D, C, Sur x 2 presentations at $\frac{1}{15^{th}}$ second (% correct score calculated)</td>
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Example of the METT Training
Post Training - METT and EMT Assessments
Results
**METT and EMT** Pre-Training

* Controls > Patients p<0.03

* Controls > Patients p<0.04
**METT and EMT Post-Training**

![Bar chart showing the percentage of correct responses for METT and EMT for Controls and Patients.](chart)

- Controls > Patients, p < 0.001
- Controls > Patients, p < 0.04
**METT and EMT Pre Cons v. Post Schiz**

![Graph showing the comparison between METT and EMT for controls and patients. The graph indicates that both conditions show percentages correct, with METT slightly higher than EMT. Both p<0.2.]

Both p<0.2
Results Summary

Both groups improved with training

Group differences apparent pre and post training (as expected)

IMPORTANTLY - patients after training do not differ significantly from controls before training on both tasks
Main Study:
Replication
Specificity
Eye movement
Replication Study
Replication Study

N=35 METT Trained Schiz
N=10 METT controls

All clients from Australia
All outpatients, medicated bar one
One-day design: Pre-training assessment, METT training, post-training assmt.
Behavioural and EM data

NP tests due to small Ns
Emotion Matching Task
Number of Errors
Significant group differences before (p<0.001) and after (p<0.04) training, pre con versus post schiz NS (p<0.2)

Schiz: Sig (p<0.001) change
Con: NS change (p<0.39)
METT Pre and Post Assessment Task - Percentage Correct
Significant group differences before (p<0.001) after training
NS (p<0.11)

Con: NS change
(p<0.49)

Schiz: Sig
(p<0.01) change

GLM - Trend (p<0.08)
Interaction, Sig both
main effects
Results Summary - Replication

Both groups improved with training as in pilot study

METT performance improved to same level as controls

IMPORTANTLY - patients after training do not differ significantly from controls before training (as in pilot study)
Is it just repetition?

Comparing the METT trained individuals (N=35) with N=12 Schiz who were repeatedly exposed (RE group) but did not receive the “active” training components.

EMT and METT Scores reported

NP tests
Specificity of the Training Effect

N = 12 Schiz Repeated Exposure (Sz-RE)
N = 10 Controls (C-METT)
N = 35 Schiz Training (Sz-METT)
Emotion Matching Task
Number of Errors
Group effect Pre training (p<0.01) but only trend for post (p<0.07)

Con < RE and METT Pre (p<0.001)
Con < RE and METT Post (p<0.04)
RE > METT Pre (p<0.04)
Con: NS change (p<0.3)
RE & METT Sig change (p<0.003)
METT Pre and Post Assessment Task - Percentage Correct
Group effect Pre training (p<0.001) and post (p<0.002)

- RE < Controls Pre and Post
- RE < METT Post
- METT < Controls Pre Only (NS Pre)
- Con and RE: NS change (p<0.3)
- METT Sig (p<0.003)

GLM - Sig Interaction, Sig both main effects
Results Summary - Specificity

RE seems to help with the matching task

RE does not confer benefit on the micro expressions tasks
Eye Movement Studies
Methods Eye Movements

METT task: 16 presentations at 5 seconds each; JACFEE images

INT task: 7 emotions, 50% and 100% x 2; Ekman and Friesen images

EYELINK II 250 Hz acquisition

Behavioural Data (accuracy)
EM parameters (for METT task only)
Eye Movement Task

a) Behavioural Data “online” from EM task
b) EM data from EM task
Behavioural Data - METT task

5 seconds free viewing of METT images
Verbal labelling required
Score out of 14 (2x each of 7 emotions)

METT Schiz (N=30)
METT Controls (N=10)
RE Schiz (N=11)
Pre training trend (p<0.06) for group difference, Post training NS

Change Con- p<0.005
Schiz - p<0.001
### Effect of repetition explored with inclusion of the RE group

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<tr>
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<th>Pre Training</th>
<th>Post Training</th>
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<tr>
<td>scz training</td>
<td>10.00</td>
<td>12.00</td>
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<tr>
<td>con training</td>
<td>12.00</td>
<td>13.00</td>
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<tr>
<td>re</td>
<td>11.00</td>
<td>12.00</td>
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**Mean # Correct (max 14)**

**Change Con-Sig**

**Schiz-Sig**

**RE - NS**
Wilcoxon test: pre v post performance for each emotion, Bonferroni correction

**SCZ METT**: Significant change for contempt (p<0.001); trends for surprise (p<0.08), sad (p<0.05), disgust (p<0.06), happy (p<0.08) and fear (p<0.06). For anger no change (p<0.19).

**CON METT**: sig change for contempt (p<0.006), trend for disgust (p<0.1)

**SCZ RE**: no significant changes
Graph of different emotions, behavioural data from METT EM task
Second task (INT) Accuracy Scores

ScM and CM - trends (p<0.07) for increase
RE - NS

Scz-METT  Pre Training  Post Training
C-METT  Pre Training  Post Training
Scz-RE  Pre Training  Post Training
Eye Movement Variables

1) Global Eye Movements
2) Emotions
3) ROIs
4) Specific Training Effects

Only for IMMEDIATE pre v post training
Global Eye Movements

Mean fixation duration, mean number of saccades, mean number of fixations

Pre and Post Training
Irrespective of Emotion or ROI

Schiz v Controls
Mean number of fixations
Mean fixation duration
Mean number of saccades

schiz cont
0.00 3.00 6.00 9.00 12.00 15.00

Mean fixation duration Pre
Mean fixation duration Post

Mean number of fixations Pre
Mean number of fixations Post

Mean Number of Saccades Pre
Mean Number of Saccades Post

Everything NS!
Separate Emotions

Fear, Anger, Happy, Sad, Disgust, Contempt, Surprise

**DVs:** percentage of fixations in the feature areas

Remember: Behavioural Data suggests improvements in majority of emotions (bar anger) for schiz and only contempt for controls
No significant Group effects pre or post

Change:

**Schiz Fear** p<0.01

Surprise trend (p<0.07)

Controls: Anger p<0.02
Schiz - Fear - where are they looking?
Visually contrast this with Anger (where no imprint)
Visually contrast this with Anger (CONTROLS with imprt)
Region of Interest Analyses

Five regions of interest: right eye, left eye, nose top, nose bottom, mouth

DVs: percentage of fixations in the ROI (collapsed across emotion)

BETWEEN GROUP DIFFERENCES PRE AND POST TRAINING

→ Pre training: Scz patients direct fewer percentage of fixations to the right eye compared to controls (p<0.01)
→ Post training: STILL Scz patients direct fewer percentage of fixations to the right eye compared to controls (p<0.01)
ROI Analysis: % Fixations in the ROI

Controls > Schiz % fixation to RIGHT eye pre and post (both p<0.01)
Specific Training Effects
(as relates to the training tool)

The case of CONTEMPT
% Fixations to the Mouth for Contempt

Change scores: schiz (p<0.04), controls (p<0.14).
Overall Summary

Behaviourally improvements are made on a number of verbal and non-verbal emotional tasks

Training with METT confers more benefit than just Repeated exposure (but note EMT results)

Eye movements show some subtle effects but overall gross changes not apparent (!?)

Something strange is happening with the RIGHT EYE!!
How does this relate to the real world?

Social Functioning Scale- pre training schiz < controls, no effect of training

L-Social Anxiety Scale - no difference between schiz training groups, no effect of training

Sp State Anxiety Scale - no difference between schiz training groups, no effect of training

TASIT - no difference between schiz training groups, immediate training no effect, improvement over sessions for the METT+4 group
How does this relate to the real world II?

Tams Questionnaire - no sig differences between training groups at baseline, trend for post training increased in METT trained groups (but not RE group)
- linear improvement in the METT+4 group
Acknowledgements

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Client Pre Training to Anger
Client Post Training to Anger
Client Pre Training to Anger
Client Post Training to Anger
Booster Sessions of Training
N=16 Schiz
5 x METT Cd-ROM
Percentage pre and post each training session
Improvements over time with the METT training - accuracy on METT assessment N = 16 Scz

![Bar chart showing mean percentage correct at different time points.](chart.png)
Results

Main effect of training (p<0.04)
All time points significantly different from baseline (p<0.001)

Best explained by a linear trend (p<0.01)
OLD SLIDES
Future analysis

EM to regions of interest for different emotions

Examination of questionnaire data (social functioning indices)

Examination of symptoms

Other experimental tasks (EMT, RAT, TASIT)
Discussion Points

Any comments?

Bringing unconscious processes into consciousness - what is the cost?
Main effect training (p<0.001), no interaction, no main effect of group
Eye Movement Data: II - ROIS

Fixation Count

- Main effect of training
- Main effect of ROI
- No main effect of group or any interactions involving group
- Training by ROI interaction.

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<tr>
<th>Eyes Pre</th>
<th>Eyes Post</th>
<th>Nose Pre</th>
<th>Nose Post</th>
<th>Mouth Pre</th>
<th>Mouth Post</th>
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Scz | C
Pre and Post Average No. Fixations

Trend training effect (p<0.09)
No group effect
No interaction
Change:
Scz p<0.05
C -NS

Collapsed over emotion
Pre and Post Total Number of Fixations

- Training effect (p<0.001)
- Trend for group effect (p<0.1; Scz > C), sig. interaction (p<0.01)
- Change Scz p<0.001
  C - NS

Collapsed over emotion