Face-to-face Single Display Groupware Encouraging Positive Participation

Can you really have excellent communication even in a face-to-face environment?
- Factors preventing communication:
  - ex1: Being engrossed in operation of each input device
  - ex2: Gazing at one's and others' operation of a shared display
- Our concepts for a face-to-face SDG encouraging positive participation:
  - focus of argument awareness, positive input, behavior awareness, and historical awareness

Focus of argument awareness: a user should grasp the focus of an argument easily.
- Frame has a visual appearance
- Center of frame is the center of balance of all users' pen pointer location.
- Frame moves interlock with each user's pointer to keep a user's gaze.

Behavior awareness: a user should easily become aware of changes in others' behavior.
- Visual representation of a user's writing/speaking behavior using the transparency of objects on the shared display.
- Writing behavior: transparency of a multiple pointer
- Speaking behavior: transparency of the user's arc of the circular frame

Positive input: a user should be able to input positively.
- Limited parallel input interface limits the input range in the circular frame.
- Users whose pointers are inside the frame can write in the frame of the display at the same time.
- This doesn't cause a related mental burden.

Historical awareness: a user should be able to survey the extent of his own and others participation easily.
- Visual, continuous representation of a user's percentage writing or speaking from the beginning of meeting using the size of objects on the shared display.
- Amount of a user's writing: the size of the user's pointer
- Amount of a user's speaking: the angle of the user's arc of the circular frame

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Tablets

Shared/Single display

Microphones

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Experiment A

Experiment B

Group’s task accuracy

<table>
<thead>
<tr>
<th></th>
<th>Proposed</th>
<th>Parallel</th>
<th>One-tailed t-test</th>
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<tbody>
<tr>
<td>Mean</td>
<td>STD</td>
<td>Mean</td>
<td>STD</td>
</tr>
<tr>
<td>Exp.A</td>
<td>100.00</td>
<td>0.00</td>
<td>100.00</td>
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<tr>
<td>Exp.B</td>
<td>93.33</td>
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<td>78.00</td>
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Group’s task time (minutes)

<table>
<thead>
<tr>
<th></th>
<th>Exp.A</th>
<th>Exp.B</th>
<th>One-tailed t-test</th>
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<tbody>
<tr>
<td>Writing</td>
<td>7.75</td>
<td>6.29</td>
<td>t=1.444</td>
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<td>Speaking</td>
<td>26.62</td>
<td>44.17</td>
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Participants’ memory accuracy

<table>
<thead>
<tr>
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<th>Exp.B</th>
<th>One-tailed t-test</th>
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<tbody>
<tr>
<td>Microphones</td>
<td>29.64</td>
<td>22.34</td>
<td>t=2.568</td>
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<td>17.98</td>
<td>12.04</td>
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