

# Face-to-face Single Display Groupware Encouraging Positive Participation

Junko Ichino<sup>1</sup>  
<sup>1</sup>Kobe University  
 ichino@khn.nict.go.jp

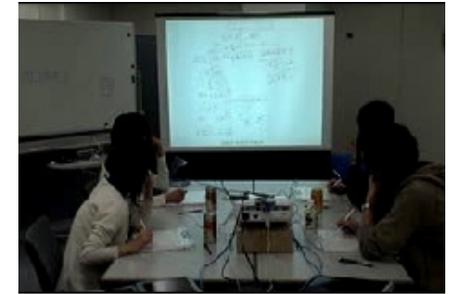
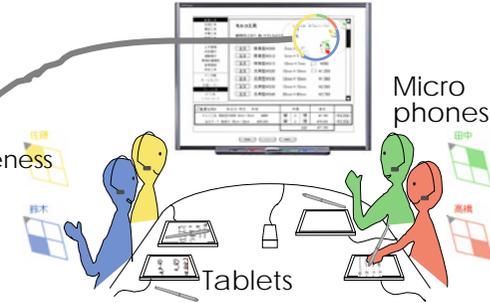
Kazuhiro Takeuchi<sup>2</sup>  
<sup>2</sup>Osaka Electro-Communication University  
 takeuchi@isc.osakac.ac.jp

Hitoshi Isahara<sup>13</sup>  
<sup>3</sup>National Institute of Information and Communications Technology  
 isahara@nict.go.jp

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

Shared/Single display



**Focus of argument awareness**: a user should grasp the focus of an argument easily.

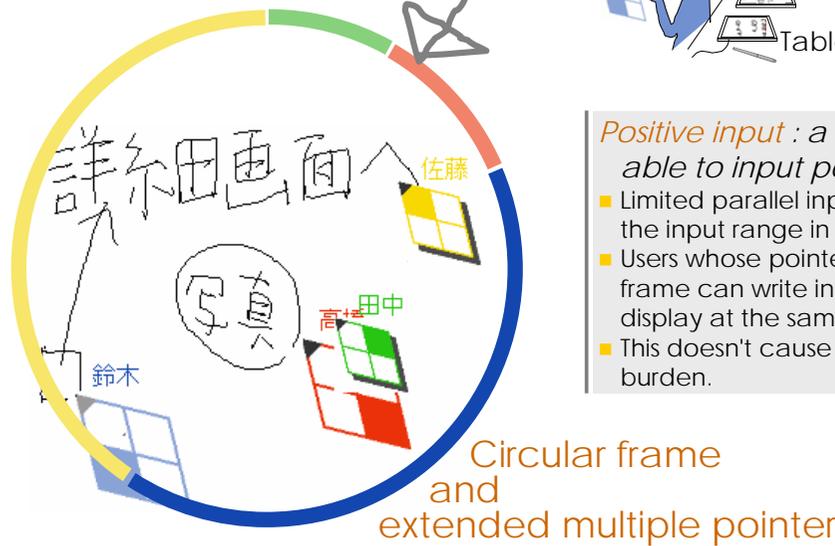
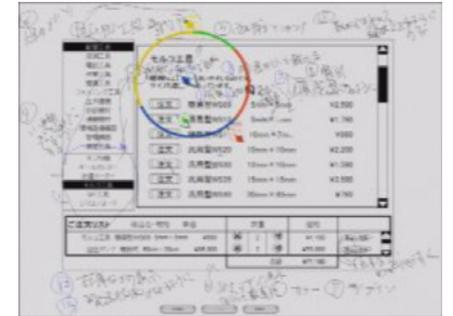
- Frame has a visual appearance
- Center of frame is the center of balance of all users' pen pointer location.
- Frame moves interlock with each user's pointer to keep a user's gaze.

**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

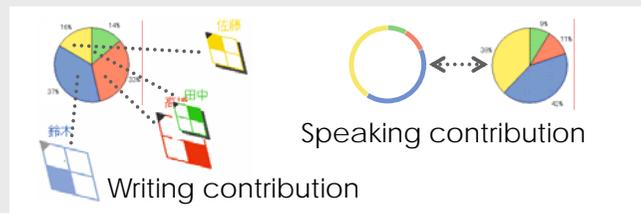
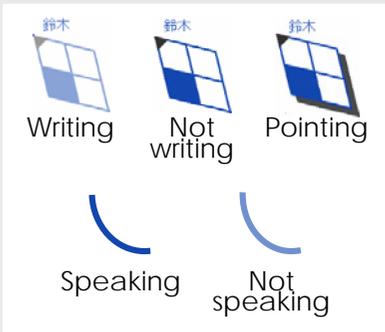
**Positive input**: a user should be able to input positively.

- 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.

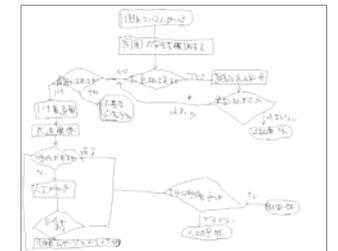


**Historical awareness**: a user should be able to survey the extent of his own and others participation easily.

- 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



Experiment A



Experiment B

Group's task accuracy

	Proposed		Parallel		One-tailed t-test	
	Mean	Std	Mean	Std		
Exp.A	100.00	0.00	100.00	0.00	-	-
Exp.B	93.33	8.16	78.00	17.89	t=1.891	p<0.05

Group's task time (minutes)

Exp.A	7.75	1.56	6.29	0.78	t=1.444	p=0.111
Exp.B	fixed time (twenty minutes)					

Participants' memory accuracy

Exp.A	26.62	17.98	12.04	7.97	t=2.568	p<0.01
Exp.B	67.15	29.64	44.17	22.34	t=2.246	p<0.05