

# **VIDEO CONFERENCING SYSTEMS: TELEPRESENCE AND SELECTION INTERVIEWS.**

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Increasingly, desktop video conferencing (DVC) is being used for remote selection interviews. To date there has been little research in this area. The present paper reports a study of the effect of visual degradation on participants' perceptions of job 'applicants' and feeling of telepresence. Participants viewed videos of eight role-played job 'applicants' under eight conditions. Conditions varied by bandwidth (maximum amount of information that can be passed per second) and resolution/Fps (frames per second). Participants completed questionnaires measuring impression formation and attitudes to various aspects of the DVC system. Analyses showed that reported feelings of telepresence increased with the bandwidth although impression formation did not alter.

## **Introduction**

Desktop video conferencing systems are increasingly being used for occupational selection. This trend is caused mainly by the expanding globalisation of industry and commerce and the increased availability of low cost, network-based, desktop video conferencing (DVC). As an alternative to face to face interviews, this method offers the same time and monetary gains of the telephone, with the added advantage of visual information regarding the remote individual and environment, along with the use of shared applications. To date there is a dearth of systematic research exploring the important issues that this raises. For example the effect that various technical aspects of DVC (such as: visual quality, audio quality, half versus full duplex audio, image size, number and type of shared applications) may have on the interview process and outcome

Generalisations from the literature concerning video-mediated collaboration, informal communication, and consultation are difficult if not impossible because of differences in technology from year to year and from study to study. Systematic investigation into the various technological aspects of DVC is needed to optimise use of present systems for general and specific uses (for example, selection interviews). This

paper considers the role of bandwidth, resolution and frame rates, and it takes steps towards ascertaining whether DVC is an adequate medium for selection interviews.

Telepresence refers to the feeling participants communicating remotely have of sharing a social space. Muhlbach et al (1995), for example found that increased eye contact angles and stereoscopy caused no differences in telepresence or satisfaction with the video conferencing system. It is possible that visual aspects such as resolution, frame rates and bandwidth may influence feelings of telepresence. The present study determines the role of such aspects of DVC on telepresence.

The importance of non-verbal behaviour on impression formation of interviewees is well documented (see Anderson, 1992 for a review). It has been stated that non-verbal behaviour tends to be missed in video-mediated communication (Heath and Luff, 1991) and this may effect impression formation. Lack of non-verbal cues may cause more attention to be paid to the content of speech. Another possibility is that lack of direct eye contact (caused by the camera angle) may produce negative impressions. Indeed Storck and Sproull (1995), in a study of video-mediated communication, state that 'the impressions people form of remote others are different from and less positive than the impressions they form of face to face others' (p197). More recently, a comparison of video-mediated and face to face selection interviews found that some aspects of interviewer ratings were less positive in the video-mediated condition (Silvester and Martin, 1998). The present study aims to ascertain whether the quality in terms of bandwidth and visual display will impact on impression formation and whether there is a quality threshold.

## **Method**

### *Participants*

Twenty-four participants (twelve male, twelve female, aged between 18 and 41 with a modal age of 22) were recruited by advertising throughout the University campus. Each participant was paid a nominal fee. Nineteen of the participants had no interviewing experience, two had very little, and three had some experience.

### *Equipment, Set-up and Materials*

Equipment comprised a 28 inch monitor, two Pentium II PC's fitted with the Zydacron ONWAN 250 package (ONWAN software, ONWAN 250 'Codec' board), and a Phillips camera supplied with the ONWAN kit including an internal microphone.

A link between a research laboratory and a conference room was established via a 10MB Ethernet LAN. The video conferencing boards communicated over this via TAPI software provided with the Zydacron package. Technical support was based in the research laboratory and the camera, based in the conference room, was connected to the PC in the research laboratory to provide information on progress to the technical support. The video recorder was connected to the 'codec' board in the research laboratory so that the images could be treated as live pictures when sent to the conference room.

The eight conditions were achieved by using the options on the software package and were comprised of four different bandwidths: 56K, 128K, 224K and 384K (within each the software designated 18K to the audio and 'protocol' channels). Within each of the four bandwidth conditions, two options made up the eight conditions: low resolution with high frame rates (option 'QCIF' = 176x144 pixels with a maximum of 30fps) and high resolution with low frame-rates (option 'CIF' = 352x288 pixels with a maximum of 15fps). It should be noted that resolution is inversely related to frame rates per second

(fps) due the software. For each condition the audio quality was set at the lowest quality mode (G728) which was available for all four bandwidths. The options were selected before the video conference call was made from the research laboratory to the conference room for each condition.

Eight videos of a 1-2minute ‘application speech’ were produced using four male and four female actors. The mock position was that of graduate marketing trainee and the speeches focused on experience in four areas pertinent to the post (data analysis, teamwork, liasing/negotiation, and creativity/innovation).

A questionnaire containing several five-point Likert-type scales relating to aspects of impression formation (such as: warmth, friendliness, honesty, and confidence), telepresence (for example: feeling of sharing a space and similarity to face to face communication) and attitudes to the DVC (for example overall rating of the DVC system) was developed.

### *Procedure*

Participants were situated in the conference room to create an interview atmosphere, and were seated at approximately 1.5 metres from the monitor. They viewed the eight videos on the monitor under the eight conditions. Counterbalancing ensured that each condition and each ‘applicant’ video occurred three times in each position (i.e. first, second etc.) over the entire experiment. Each ‘applicant’ video appeared under each condition no less than twice and no more than four times, with an average of three times under each condition.

Participants were informed of the position the ‘applicants’ were applying for and the qualities and skills that were relevant to the post. They were then requested to watch each ‘applicant’ video and complete the questionnaires as quickly as possible.

## **Results**

### *Telepresence*

From Table 1 it is clear that with both the resolution/fps conditions the four bandwidths affected perceived telepresence, the greatest difference occurring between 56K and 128K (low resolution/high fps (QCIF);  $t=2.58(23)P<0.05$ , high resolution/low fps (CIF);  $t=4.76(23)P<0.001$ ). It is at this point that the greatest increase in telepresence occurred especially for the high resolution/low fps (CIF) condition. Increasing the bandwidth after 128K, caused little, if any increase in telepresence and even reduced it slightly at 224K under the high resolution/low fps (CIF) condition.

**Table 1. Telepresence Ratings by Bandwidth and Resolution/fps Conditions**

	Resolution			
	Low (QCIF)		High (CIF)	
<i>Bandwidth (K)</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
56	3.17	1.31	3.42	1.56
128	3.92	1.50	5.12	1.33
224	4.43	1.47	4.87	1.60
384	4.50	1.56	5.17	1.83

Repeated measures ANOVAs (See Table 2) revealed significant differences in telepresence ratings for the four bandwidths in both the high resolution/low fps (CIF) and low resolution/high fps (QCIF) conditions ( $P < 0.001$ ). Although the high resolution/low fps setting (CIF) produced higher telepresence ratings than the low resolution/high fps setting (QCIF) this was only significant at 128K ( $t = 4.73$  (23)  $P < .001$ ).

**Table 2. ANOVAs :Telepresence Ratings for Bandwidth and Resolution/fps Conditions**

Resolution	Source	DF	SS	MS	F-ratio	P
Low (QCIF)	Within-Subjects	3	28.17	9.39		
	Error	66	102.33	1.55	6.06	.001
High (CIF)	Within-Subjects	3	49.54	16.51		
	Error	69	118.46	1.72	9.62	.001

#### *Impression Formation*

Repeated measures ANOVAs for impression formation ratings did not yield significant differences ( $P > 0.05$ ) in either the low resolution/high fps (QCIF) condition or the high resolution/low fps (CIF) conditions. It is clear that the mean scores for each bandwidth are very similar differing by a maximum of 0.26 across conditions, with very little difference in the standard deviations (See Table 3).

**Table 3. Impression Formation Ratings by Bandwidth and Resolution/fps Conditions**

	Resolution			
	Low (QCIF)		High (CIF)	
<i>Bandwidth (K)</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
56	3.22	0.50	3.23	0.60
128	3.02	0.51	3.22	0.58
224	3.14	0.54	3.21	0.54
384	3.28	0.59	3.23	0.60

#### *Summary of Results*

Results suggest that an increase in telepresence did occur with an increase in bandwidth for both the low resolution/high fps and high resolution/low fps conditions but that the threshold lies at 128K after which no significant increase occurs. Analysis also suggests that impression formation does not change with the quality of the visual aspects of the DVC system.

#### **Discussion**

From the results it would appear that bandwidth and resolution/fps alter perceptions of telepresence. Higher bandwidths lead to a greater feeling of telepresence in the low resolution/high fps condition. Although the same is true for 56K and 128K in the high resolution/low fps condition, for the two higher bandwidth conditions this does not appear to remain true.

Due to the nature of the Zydacron software (and most DVC software) it was not possible to separate resolution from frame rate. In other words they are inversely related so that an increase in one necessarily causes a decrease in the other. Thus, it is not possible to draw conclusions regarding the separate role each plays in the ratings of

telepresence. It should also be noted that this was not an interactive situation and participants did not have the opportunity for two-way communication. However, the results suggest that at 56K ratings of telepresence are low and that at 128K this increases. It can also be concluded that once this threshold has been reached increases in bandwidth also cause increases in telepresence but to a lesser extent.

The results also indicated that impression formation was not affected by differences in bandwidth, suggesting that interviews held over DVC systems would not suffer as a result of available bandwidth or the resolution/fps. This suggests that low cost and low quality DVC should not cause differences in impression formation ratings. This is perhaps good news for small and medium sized enterprises that wish to utilise this technology for recruitment purposes. This does not rule out the possibility that video-mediated interviews will differ from face to face interviews generally (as suggested by Silvester and Martin, 1998). Additionally, although no differences were found resulting from resolution and bandwidth, further research may find an impact on impression formation as a result of audio quality, image size, number of and type of shared applications, camera angles or full/half duplex audio.

In conclusion it has been shown here that perceived telepresence increased as a result of an increase in bandwidth, but that the threshold is 128K, after which no significant increase occurred. It has also been shown that bandwidth and resolution/fps did not affect participants' impressions of 'job applicants'. Further research is needed to ascertain the reliability of video-mediated selection interviews and the technical aspects that may be influential.

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