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EXPERTS MEETING ON SUBJECTIVE AND OBJECTIVE VIDEO QUALITY ASSESSMENT
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Source[1]: FRANCE TELECOM/CNET

Title : Some results from a methodological preliminary experiment for assessing the audio-visual quality in group communication.

1. INTRODUCTION

This experiment was realised by two departments within CNET : one specialist of video signal and visual quality evaluation based in CCETT Rennes (QLI), the other specialist of audio signal and speech quality evaluation based in Lannion (CMC). Both departments have different cultures: the expertise of CCETT Rennes is well known on visual quality assessment for TV diffusion, its researchers are active within the ITU-R community and their standard methodological procedures are those recommended in ITU-R (A-500), while the expertise of Lannion is established in speech quality assessment for telecommunications, its researchers are active within the ITU-T community (Com12) and their current methodological procedures are based on Recommendations ITU-T (P.800). The main difference between those two applicative contexts is that QLI and ITU-R are mainly devoted to high quality diffusion (for both audio and video signals) and are concerned with perceived quality by individuals taken as passive spectators (observers) only, while CMC and ITU-T are mainly devoted to interactive services where individuals are engaged in, at least, a conversation but concerned by a lower quality than the television's ones. With the development of videoconferencing equipments and services where both signals audio and video are delivered to active subjects, engaged in sophisticated tasks, the ITU-T community is faced to the necessity to take simultaneously into account terms which define audio quality as well as visual quality. The range of quality covered by these new videoconferencing services is limited by the transmission capacity allocated to each channel : nowadays 2 Mbs for image and necessary rate to correctly encode a 7 kHz-band for speech (an on going ITU-T standardisation program tempts to achieve good speech and music qualities with only 16 kbs). The bit rates within ITU-R for television application are currently 2 to 50 Mbs for image and n x 64 kbs (n=1 to 6) for sound. This experiment was the first attempt of a collaborative work on this new field. The problematic around this work might be seen as a reduction of questions raised, within this experts meeting which tries for the first time to mix ITU-R and ITU-T preoccupations. The goal of the experiment was to measure the relative predominance of some audio-visual parameters involved in perceived quality within a group communication service.

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2 METHODOLOGICAL PROCEDURES

For these tests, conversational situations between groups of persons are simulated in a controlled environment. The experimental context and the interactive situation are derived from the so called « conversation tests » used for a long time within ITU-T Com 12 for the only sound. Subjects are split into two groups and placed in two distinct visioconference rooms. They are asked to hold a conversation with the help of a pretext, generally a game such as :

- rebuilding of sentences from segments shared by the two rooms,
- rebuilding of puzzles from information given by the other group,
- search of difference in drawings distributed to both rooms,
- answering questions from « Trivial pursuit » or other commercial games.

Two different procedures were used for the evaluation : one promoted by ITU-R the Single Stimulus Continuous Quality Evaluation (SSCQE) procedure, the other one recommended by ITU-T (P.920), a multicriteria approach based on category ratings. The essential differences between both procedures are the type of response gathered from the subjects and the way experimental configurations are presented to them. The quality provided to the subjects was changed according the variation of some audio-visual parameters :

- bit rate for the video signal (128 kbs, 384 kbs & 2 Mbs)
- frequency range for the audio signal (3 kHz, 7 kHz & 15 kHz)
- type of sound restitution : monophonic (1 central loudspeaker) or spatialised (3 or 5 loudspeakers)
- sound level (46, 49, 52, 55 & 58 dBA)
- delay between audio and video signals (+ 100 ms /- 150 ms)

The whole set of parameters were studied in the first part of the experiment, conducted according to the SSCQE procedure ; only a small subset of experimental conditions was evaluated in the second part of the experiment following P.920.

Subjects were non-experts students without any knowledge and practice of neither group communication nor audio-visual evaluation. They were invited by groups of six persons which should be very familiar to each other in order to avoid that any difficulty or observed defaults during the conversation be attributed to a specific behaviour of any participant. Each group was distributed in two rooms with 3 persons per room. Six groups participated in the first part of the experiment (SSCQE procedure), only 4 groups of persons were involved in the second part (P.920 procedure) after completion of the first part. The subjects were asked to come for 3 visits of approximately 2 hours each. Annex 1gives the descriptive plan of one of the two rooms.

2.1 Single Stimulus Continuous Quality Evaluation (SSCQE, ITU-R)

The Single Stimulus Continuous Quality Evaluation (SSCQE) procedure has been developed with the production by digital television compression of impairments to picture quality which are time-varying and scene dependent. It is now standardised in ITU-R Recommendation BT.500-7 along with other conventional methodologies for assessing the quality of television pictures. The stimulus presentation in SSCQE procedure replicates more accurately than the often used double stimulus method of laboratory testing the home viewing conditions. Originally, the application of this method is for a situation where subjects are facing their TV set with no other task to perform than watching the screen. In this context, it leads to particularly valuable results.

In this procedure, subjects are asked to handle a slider which position reflects their quality assessment at time t : the range of the slider's travel corresponding to the continuous quality scale divided into five equal lengths as in the normal and well known five-point quality scale. The position given by subjects are recorded twice a second and the duration of the program is at least 5 minutes while a test session is generally around 30 mn. The idea was to enlarge the application's field to a conversational

situation where subjects are engaged in active audio-visual communication with distant partners. In that case, subjects are faced to two simultaneous and distinct tasks : one is to maintain interactive communication with the other group and the second to handle a slider to translate their individual perception of the global quality.

Across each test session, the quality was modulated by a variation of some audio-visual parameters, but the subjects should not be aware of these changes. The whole set of audio parameters is supposed to be varied without being immediately noticeable while any change in the video bit rate obviously produces a visible artefact. It was, thus, decided to conduct each test session with a fixed bit rate for the video signal (either 128 kbs, or 384 kbs or 2 Mbs) and have the audio parameters to vary apart from a basic configuration (15 kHz, mono, mean sound level 52 dBA and zero delay).

Each test session was approximately 25 minutes long, required a unique conversational pretext to stimulate the exchange between both groups of subjects, started with 1'30 of presentation of the basic configuration associated with the given video bit rate and allowed the evaluation of 6 experimental conditions which duration was 2'30 each. In order to remind the subjects which were deeply engaged within their play activity that they were asked to perform a second task : moving the slider, a signalling sound was regularly emitted but not in concomitance with the parameter commutation. Without the signalling tone, the evaluation act would have been probably forgotten.

2.2 Interactive test methods for audio-visual communications (P.920, ITU-T)

For the second part of the experiment, the conventional presentation of configurations has been used as recommended in P.800 for sound and P.920 for audio-visual. Each conversation is hold through a distinct audio-visual configuration with the help of a different conversational task. At the end of each communication, subjects are individually asked to assess the perceived quality of the connection. The response sheet that they should fill in involves several questions, usually half a dozen (see the french version of the questionnaire reported in Annex 2). The sheet groups together descriptive criteria and opinion criteria in order to allow a detailed evaluation of the different aspects of the quality of an audio-visual communication. The experiment is based on a graeco-latin square **n x n**. A subset of only n=4 configurations were chosen to be evaluated according to P.920. These configurations are listed below :

Configuration N°1= 15 kHz, mono, 384 kbit/s, Dav= 0 ms
Configuration N°2= 3 kHz, mono, 2 Mbit/s, Dav= 0 ms
Configuration N°3= 15 kHz, spatial, 2 Mbit/s, Dav= 0 ms
Configuration N°4= 7 kHz, spatial, 384 kbit/s, Dav=-150 ms

Consequently a total of 24 subjects (4 different groups of 6 individuals distributed in 2 rooms) participate in a final test session.

To assess the perceived quality, a questionnaire was elaborated based on several categorical judgement scales according to example given in Appendix II of P.920. Five-point scales are generally used and, as a minimum, a quality scale for audio, video and audio-visual signals (leading to the well known mean opinion score MOS) and two impairment scales (leading to degradation mean opinion score DMOS) : various annoyance scale and annoyance due to the delay between sound and image. The impairment scale is taken out of the DCR method but its application to conversation tests differs from the procedure recommended for the listening tests in that no explicit good quality reference is introduced prior to each evaluation. In fact two questionnaires were elaborated and shared into both rooms, in order to test all questions with a maximum of 10 per questionnaire.

Questionnaire A	**Questionnaire B**
Q1A : realism (5-point scale)	Q1B : presence/proximity (5-point scale)
Q2 : share of the same space (5-point scale)	Q2 : share of the same space (5-point scale)
Q3A : effort to be attentive (effort scale)	Q3B : effort to interrupt (effort scale)
Q4 : various annoyance (DMOS scale)	

Q5 : annoyance caused by the delay between Sound and Image (DMOS scale) Q6 : audio quality (MOS scale) Q7 : video quality (MOS scale) Q8 : overall quality (MOS scale) Q9 : communication difficulty (binary choice) Q10 : acceptability of communication (binary choice) Extra Question Q11 : sound level (5-point scale)

3. EXAMPLES OF RESULTS

A complete report of the results of this experiment can be found in [3]. For this contribution, we have only extracted some results related to the most important parameters which have been introduced in the test plan : the video rate and the audio bandwidth.

3.1 Results from the SSCQE procedure

Results have been collated from all test sessions where the SSCQE method have been used and graphically displayed on figures 1 to 4. The curves give the percentage of time for which a notation greater than the one marked in abscissa was obtained (the slider's position was converted on a [0,100] scale). The three video rates are clearly differentiated by the subjects, Fig. 1 showing a bigger perceived gap from 384 kbs to 2 Mbs than from 128 kbs to 384 kbs. If a threshold of acceptability is said to be for a 50 notation, the video rate of 384 kbs seems to be very close to that threshold, but further study is needed to confirm the exact threshold value.

The influence of the audio frequency range can be seen on Figures 2 and 3 for 384 kbs and 2 Mbs respectively. Both 7 and 15 kHz bandwidth are clearly preferred to 3 kHz for any of the video rate, the 3 kHz bandwidth can be considered as unacceptable. The spatial restitution mode associated to a 15 kHz bandwidth is completely unnoticeable by the subjects, whichever bit rate is chosen for the video.

A complete data analysis of results gathered with the SSCQE method, and for a 15 kHz band-limited audio signal, demonstrates the little influence of the delay between sound and image on the perceived overall quality of a group communication device, whichever the video rate is. Moreover, a small effect was found for the sound level around the preferred level (52 dB A +/- 6 dB) ; in any case, the better the general quality, the less a high level is needed.

3.2 Results from the P.920 procedure

The graphical presentation of the data on figure 5 shows the following rank ordering of the 4 configurations which were evaluated in this part of experiment. For all subjects and the whole set of criteria, the preferred configuration is the one (C3) defined by the largest bandwidth (15 kHz), the highest video rate (2 Mbs), a spatialised sound restitution and a perfect synchronism between audio and video signals (see fig. 5). The configuration which technological cost is the highest is obviously perceived as the best one.

For a fixed video rate (384 kbs), a spatialised sound associated with a 7 kHz bandwidth (C4) is preferred -but the difference does not reach the statistical significance- to a monophonic sound of a double bandwidth (15 kHz, Conf C1). This advantage given to the spatialisation over the audio bandwidth tends to mask the delay between sound and image (100 ms) introduced in Configuration C4 and which does not seem to be perceived as such but rather as a default on the image. The gain due to the spatialised sound restitution should be further confirmed by a specific experiment built on a factorial design between bandwidth and restitution mode and including the size of the screen as a parameter.

A variance analysis performed on the 24 responses to the questionnaire leads to the conclusion that the configuration factor is highly significant (99 %), the order and task factors are generally non significant as expected. Concerning the subject factor, results are dependent from the specific criterion analysed : insignificant for Q7 : Quality of image, Q8 : Overall quality and extra question Q11 : Sound level, the subject factor is significant (95 %) for Q6 : Sound quality and Q5 : Annoyance from delay between sound and image and highly significant (99 %) for Q2 : share of the same space and Q4 : various annoyance.

The results of two statistical tests (Student t-test and Tukey test) performed in order to declare pairwise comparisons between means significant or not are reported in Table 1. It can be seen that configurations C1 and C4 are not judged significantly different according to any of the criteria, that configuration C1 and C2 are distinct on the video quality criterion (Q7). Configurations C2 and C4, which are significantly different, but in opposite directions, on the audio quality criterion (Q6) and the video quality ones (Q7) reveal to be equivalent on all other criteria, including the overall criterion (Q8). Differences between Configuration C3 and Configuration C1 are highly significant on all criteria, differences between C2 and C3 (fixed video rate) are significant on all criteria except as expected on Q7 Video Quality. Between the configurations C3 and C4, differences are always significant except on the criteria relative to the audio quality alone ; the doubling of the frequency range above 7 kHz seems not to be perceived as an true improvement when the sound restitution is already spatialised. Table 2 is a synthetic display of results from both types of procedures.

CONCLUSION

The goal of the methodological preliminary study was to analyse the strengths and the limitations of both procedures used in this experimentation in order to establish their possible complementarity for further studying the evaluation of group communication services.

The SSCQE method was developed within the context of studies for digital television. In that case, subjects have no interference in their mind which might prevent them to concentrate in their evaluation task. The large confidence interval experienced in this application and the general profile of the curves show that the double task, to which subjects were submitted here, have diminished the attention given to the slider by the subjects. The votes varied little along the presentation of a configuration and it should be reminded that the evaluation task would have been almost impossible in the context of active participation to a conversation if no signalling tone had been delivered. Another limitation of the method is the relative imprecision of the data which can explain the results concerning the non-influence of a desynchronisation between sound and image and also the absence of an observed effect of the spatialisation : only video rates and audio bandwidths were clearly identified. Moreover, the stability of the scale has been demonstrated within a European Project RACE MOSAIC but its exact signification in terms of acceptability thresholding needs to be better known. A statistic analysis appropriate to the treatment of SSCQE time varying results is still to be found. Nevertheless, the method has shown its capacity to synthetically evaluate the global quality of a group communication service and it is the first known procedure which is able to follow the temporal variation of the quality in real time. The results demonstrated a good stability of the votes along different test sessions and a good coherence.

The limitation attached to the procedure based on Recommendation P.920 is very well known : with this type of method the subjective scale is very sensitive to the range of quality introduced in the test, but the method is highly utilised within ITU-T for its robustness and efficiency. It uses a simple arithmetic to gather individual notations within a the so called «mean opinion scores» MOS and allows all applied statistical treatments on these MOS scores. Moreover, the conversation task and the evaluation task to which the subjects were submitted are completely distinct : distinguishing between both tasks being fundamental from the point of view of telecommunication specialists in order to keep reasonable attention to the system to be evaluated, and not to fall into a too great tolerance to a quality degradation. Also, the method based on a questionnaire allows to register information about the perception of individual audiovisual parameter. The two goals attached to the second part of this

experimentation were reached : to confirm the statistical validity of results coming from a graeco-latin square design and to establish the efficiency of the questionnaire.

The comparison between the two methods, even if not easy to make because of their intrinsic differences, seems to focus on the different effect of the sound spatialisation revealed by each of the experimentation : important in one experiment (P.920) while unnoticeable in the other (SSCQE). This apparent contradiction fully justifies the need for further investigation on this specific aspect of the sound characteristics ; this is what Lannion (CMC) plans to realise in the near future. Those results are the first one obtained with the SSCQE method in a context of group communications. They need to be, at least, duplicated in order to be either confirmed or not. The method seems to allow interesting investigation in interactive context, but more likely such as teleconferencing or distant teaching where the exchange is not the core of the communication. In true conversational situations, a risk exists that the simultaneity of both tasks induces a biais in the quality evaluation of an audiovisual, or even an only audio communication devices. Nevertheless, the two methods can be considered as complementarity : one proceeding from a global approach (continuous notation SSCQE), the other requiring an analytic strategy from the subjects (multicriteria category ratings P.920). The use of both methods within the same experiment might be very fruitful, as it will be possible to get in the same time the description of the perception of each parameter with the help of an analytic questionnaire, and the verification, along the whole experiment with the help of the slider of the SSCQE procedure, of the time varying perception of the global quality.

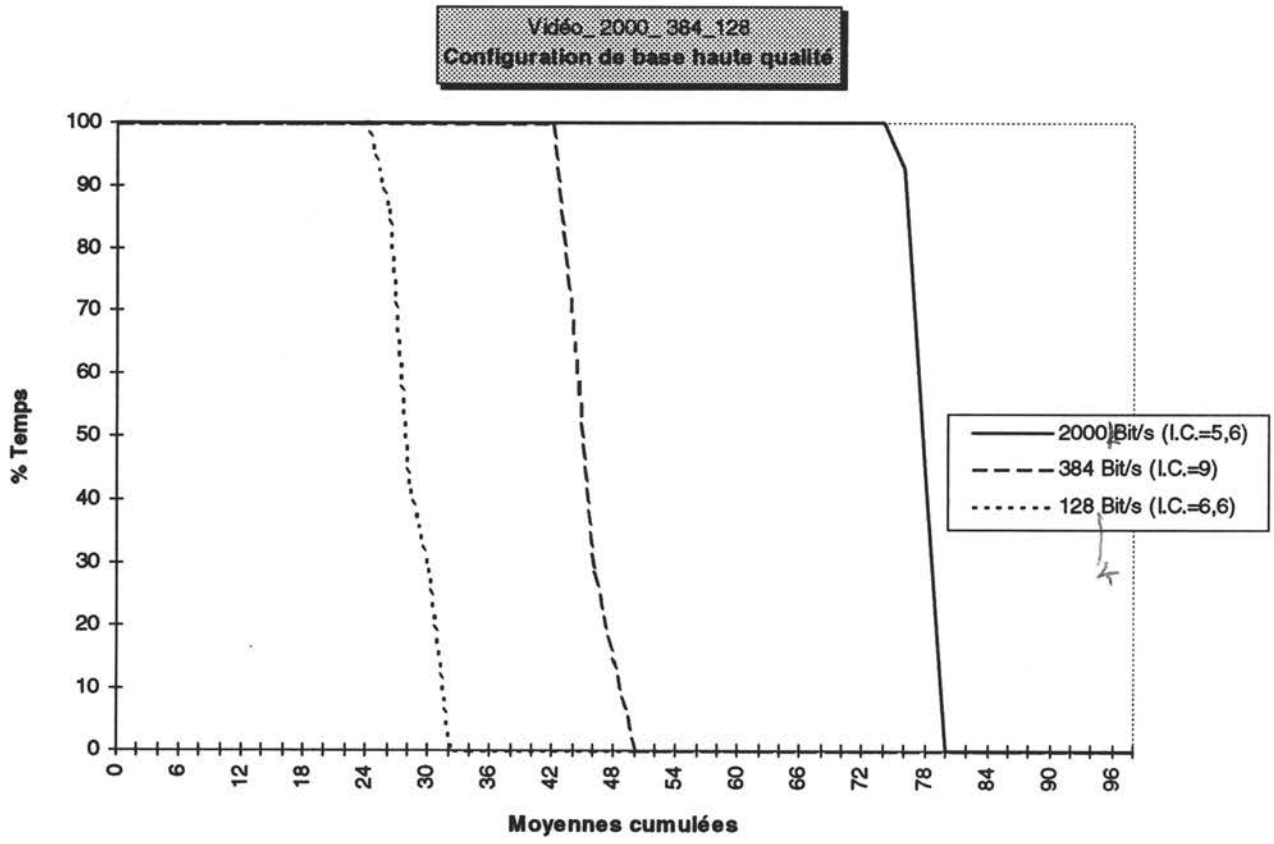
Following this preliminary experimentation, the methodological reflection should progress and include the need to develop sophisticated experimental procedures which could be able to more accurately take into account, for improvement of videoconferencing services, the interactions between sound and image. Indeed, the overall quality of such services, might not be reduced to a simple reunion of audio quality and video quality, both investigated as independent percepts. Examples are already known of mutual dependence of sound and image within a resultant perceived quality. FT/CNET (Lannion) has just started a work program on this topic with the objective to better understand, define and measure the concept of audiovisual quality.

REFERENCES

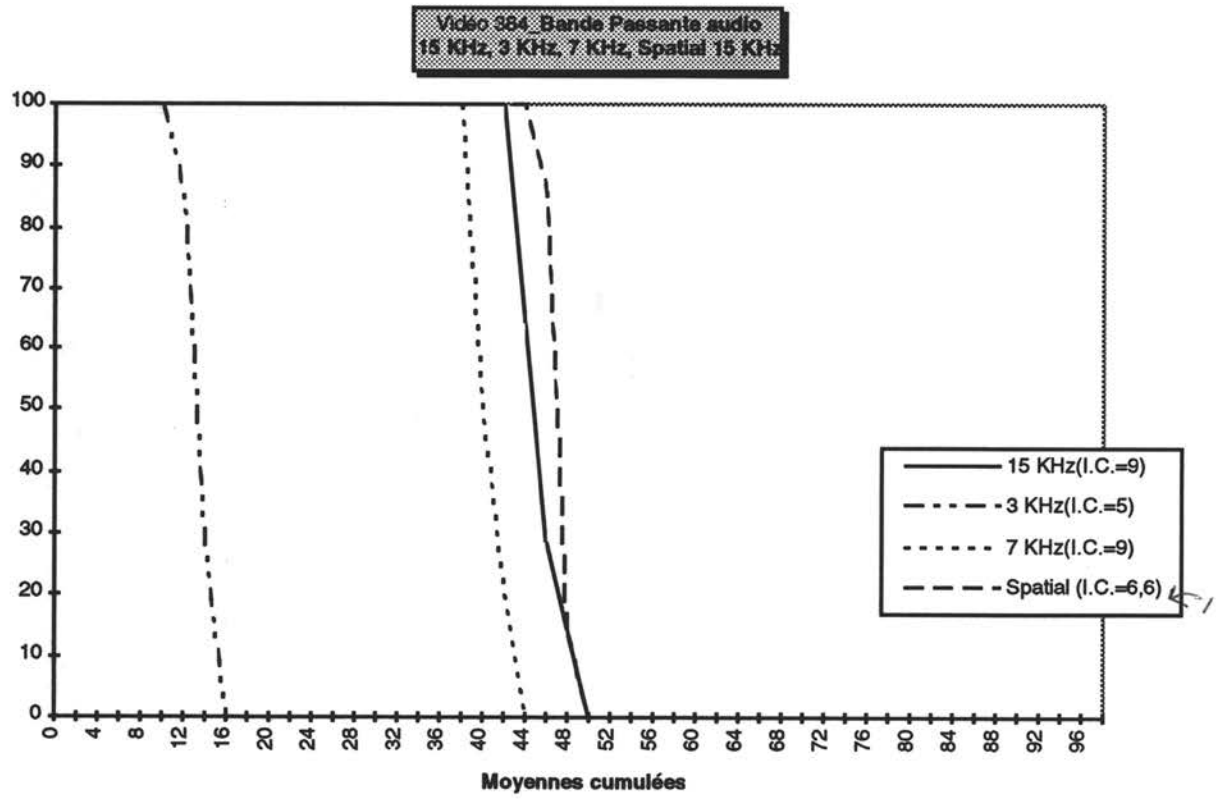
[1] ITU-R BT.500-7 : Methodology for the subjective assessment of the quality of television pictures. Working Party 11E, May 1996.

[2] ITU-T P.920 : Interactive test methods for audiovisual communications. Com 12, 1997 ? ?

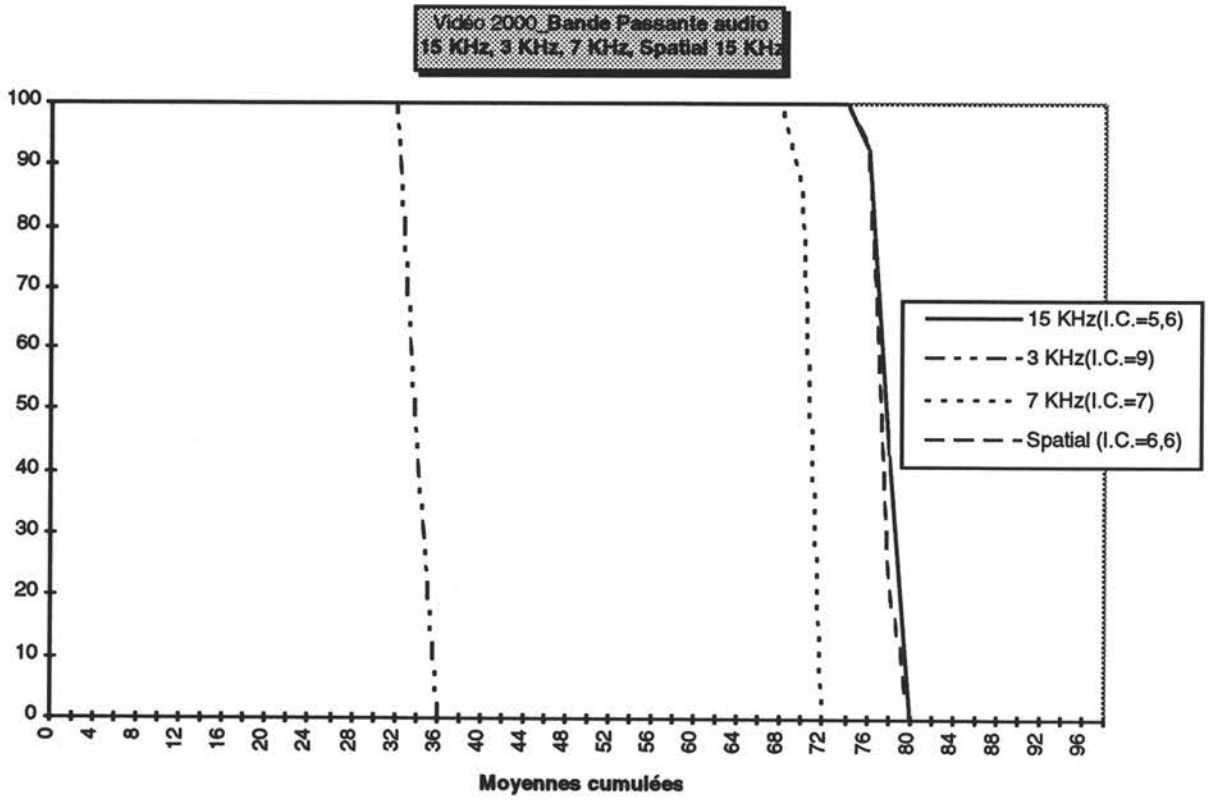
[3] E. BOURGUIGNAT, D. PASCAL, J.Ph. THOMAS, H. TCHEN, J.P. THOMAS, M. EMERIT & J.J. GAULTIER (1996) : La qualité audiovisuelle en communication de groupe : Etude méthodologique préliminaire.



- Figure 1 : Base audio configuration for each video rate -



- Figure 2 : Effect of audio bandwidth for 384 kbs video rate --



- Figure 3 : Effect of audio bandwidth for 2 Mbs video rate -


SALLE 1
MOS
5
4,5
4
3,5
3
2,5
2
1,5
1
REALISME
PRESENCE
ESPACE
EFF. suivi
EFF. interr.
DEFAUTS
DECALAGE
QUAL. son
QUAL. image
GLOBAL
C1
C2
C3
C4
Q1A
Q1B
Q2
Q3A
Q3B
Q4
Q5
Q6
Q7
Q8

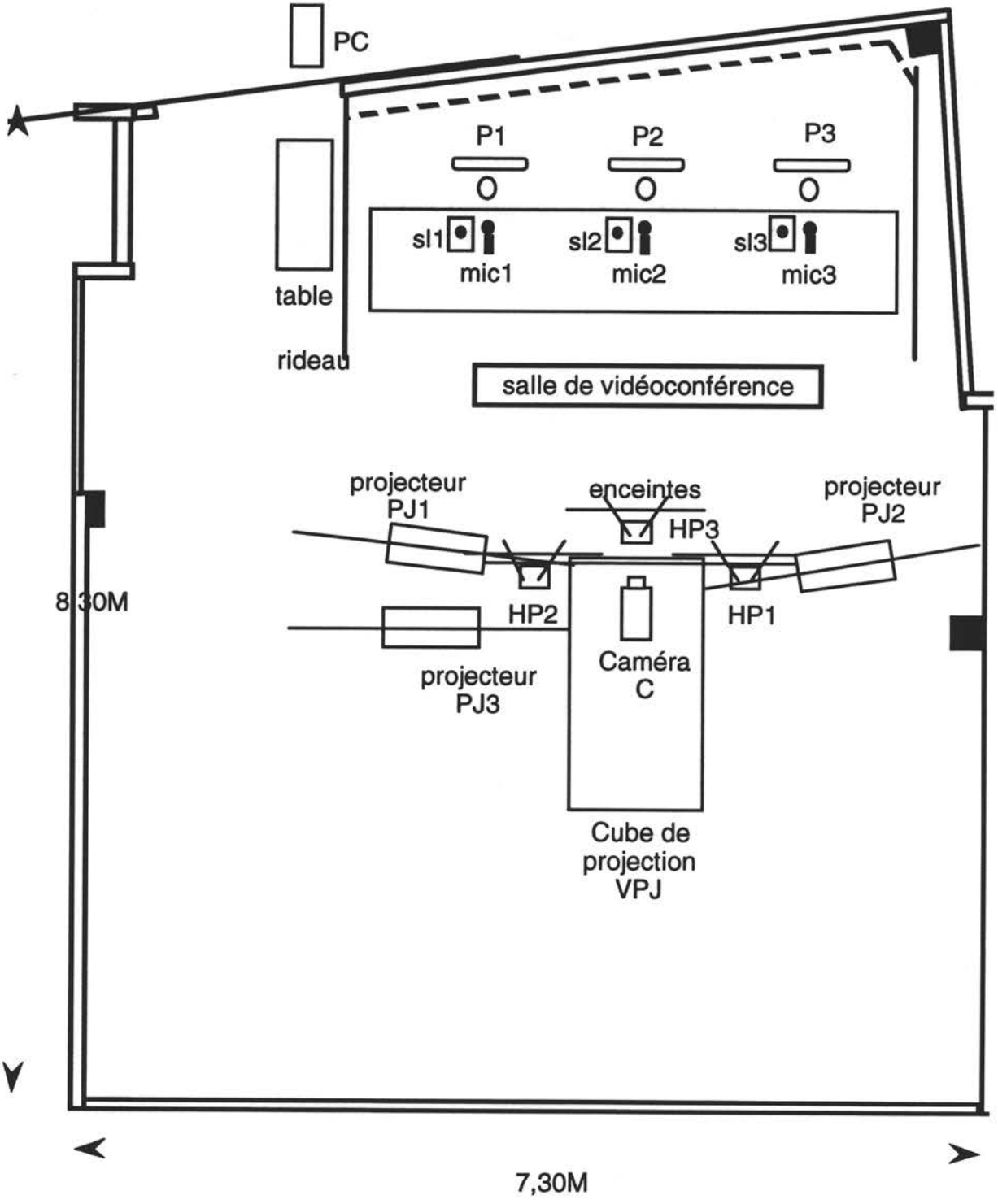
Table 1 : Pairwise comparisons between means

	Q1A	Q1B	Q2	Q3A	Q3B	Q4	Q5	Q6	Q7	Q8	Q11
C1-C2	*-0,50*	*-0,09*	-0,16	*-0,66*	*0,25*	-0,50	-0,55	0,37	-0,87 **	-0,30	0,17
C1-C3	*-1,42* **	*-0,75* *	-0,83 **	*-1,33* **	*-0,25*	-1,16 **	-1,30 **	-0,92 **	-1,25 **	-1,13 **	-0,25
C1-C4	*-0,33*	*0,16*	-0,08	*-0,58*	*-0,25*	-0,50	-0,25	-0,50	0,30	-0,17	-0,08
C2-C3	*-0,92* **	*-0,66* **	-0,67 **	*-0,67* *	*-0,50*	-0,67	-0,75 *	-1,29 **	-0,38	-0,83 **	-0,42
C2-C4	*0,17*	*0,25*	0,08	*0,08*	*-0,50*	0,00	0,29	-0,88 **	1,17 **	0,13	-0,25
C3-C4	*1,09* **	*0,91* **	0,75 **	*0,75* **	*0,00*	0,67	1,04 **	0,42	1,54 **	0,96 **	0,17

t-test ***: Q1A, Q1B, Q3A & A3B (12 subjects) * 95 %, ** 99 %***
Tukey test : Q2, Q4, Q5, Q6, Q7, Q8 & Q11 (24 subjects)

Table 2 : Summary of results from both procedures

SSCQE METHOD	Category rating method (Tendency)
Video rate : acceptable minimum 384 kbit/s	not tested
Audio bandwidth : - 3 kHz unacceptable - gain from 7 to 15 kHz just noticeable	a) audio only : - 3 kHz unacceptable - spatialised 7 kHz undistinguished from monophonic 15 kHz (at 384 kbit/s) - spatialised 7 kHz undistinguished from spatialised 15 kHz b) global : - superiority of conf. spatialised 15 kHz, 2 Mbit/s over other configurations
Sound spatialisation : without noticeable incidence	noticeable gain at 384 kbit/s of video rate *to be confirmed by a specific experiment (incidence of the size of the screens)*
Desynchronisation between sound and image : without noticeable incidence	not tested, *to be studied in an other experiment (incidence of video rate)*
Sound level : - without noticeable incidence, - the better the general quality, the lesser a high level is needed	not tested, no perceived variation of levels among configurations.



Dimensions extérieures VPJ 701S 40" **b=83cm**
h=63cm
p=173cm

Descriptive plan of one of the room

ANNEX 1

ANNEXE 2 : QUESTIONNAIRE 1

QUESTION 1

COMMENT JUGEZ-VOUS LA SITUATION DE COMMUNICATION AUDIOVISUELLE QUE VOUS VENEZ D'EXPERIMENTER ?

ARTIFICIELLE
FACTICE

REALISTE
NATURELLE

☐ ☐ ☐ ☐ ☐

(réponse dans 1 des 5 cases)

QUESTION 2

AVEZ-VOUS EU L'IMPRESSION DE PARTAGER UN MEME ESPACE AVEC VOS INTERLOCUTEURS DISTANTS ?

NON, PAS DU TOUT

OUI, TOUT A FAIT

☐ ☐ ☐ ☐ ☐

(réponse dans 1 des 5 cases)

QUESTION 3

COMMENT QUALIFIEZ-VOUS L'EFFORT NECESSAIRE **POUR SUIVRE** LA CONVERSATION AVEC VOS INTERLOCUTEURS DISTANTS ?

DETENTE ABSOLUE, CONVERSATION SUIVIE SANS AUCUN EFFORT	ATTENTION NECESSAIRE, SANS EFFORT SENSIBLE	CONVERSATION SUIVIE AVEC UN EFFORT MODERE	CONVERSATION SUIVIE AVEC UN EFFORT IMPORTANT	CONVERSATION SUIVIE AVEC UN EFFORT CONSIDERABLE
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 4

AVEZ VOUS PERCU DES DEFAUTS (hachures, coupures, écho, bruits divers ...) DURANT LA COMMUNICATION? COMMENT JUGEZ VOUS CES DEFAUTS ?

IMPERCEPTIBLES	PERCEPTIBLES MAIS NON GENANTS	LEGEREMENT GENANTS	GENANTS	TRES GENANTS
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 5

COMMENT JUGEZ-VOUS LE DECALAGE ENTRE LE SON ET L'IMAGE DANS LE SYSTEME DE COMMUNICATION AUDIOVISUEL QUE VOUS VENEZ D'UTILISER ?

IMPERCEPTIBLE	PERCEPTIBLE MAIS NON GENANT	LEGEREMENT GENANT	GENANT	TRES GENANT
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 6

COMMENT JUGEZ-VOUS LA QUALITE DU SON DANS CE SYSTEME DE COMMUNICATION AUDIOVISUEL ?

MAUVAISE	MEDIOCRE	MOYENNE	BONNE	EXCELLENTE
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 7

COMMENT JUGEZ-VOUS LA QUALITE DE L'IMAGE DANS CE SYSTEME DE COMMUNICATION AUDIOVISUEL ?

MAUVAISE ☐ MEDIOCRE ☐ MOYENNE ☐ BONNE ☐ EXCELLENTE ☐

(réponse dans 1 des 5 cases)

QUESTION 8

COMMENT JUGEZ-VOUS GLOBALEMENT LA QUALITE DE CE SYSTEME DE COMMUNICATION AUDIOVISUEL ?

MAUVAISE ☐ MEDIOCRE ☐ MOYENNE ☐ BONNE ☐ EXCELLENTE ☐

(réponse dans 1 des 5 cases)

QUESTION 9

AVEZ-VOUS EPROUVE DES DIFFICULTES DURANT LA COMMUNICATION?

OUI ☐ NON ☐

(réponse dans 1 des 2 cases)

QUESTION 10

COMMENT JUGEZ VOUS LA COMMUNICATION QUE VOUS VENEZ D'AVOIR ?

INACCEPTABLE ☐ ACCEPTABLE ☐

(réponse dans 1 des 2 cases)

pièce A ☐ pièce B ☐

QUESTION 11

VOUS AVEZ TROUVE LE NIVEAU SONORE DE LA COMMUNICATION

FAIBLE	PLUTOT FAIBLE	NORMAL	PLUTOT FORT	FORT
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

ANNEXE 2 : QUESTIONNAIRE 2

QUESTION 1

QUELLE IMPRESSION AVEZ-VOUS EU DE LA PRESENCE DE VOS INTERLOCUTEURS DISTANTS?

PRESENCE FAIBLE ACCES DIFFICILE				PRESENCE FORTE ACCES FACILE
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 2

AVEZ-VOUS EU L'IMPRESSION DE PARTAGER UN MEME ESPACE AVEC VOS INTERLOCUTEURS DISTANTS ?

NON, PAS DU TOUT				OUI, TOUT A FAIT
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 3

COMMENT QUALIFIEZ-VOUS L'EFFORT NECESSAIRE **POUR INTERROMPRE** VOS INTERLOCUTEURS DISTANTS ?

DETENTE ABSOLUE, INTERRUPTION SANS AUCUN EFFORT	ATTENTION NECESSAIRE INTERRUPTION SANS EFFORT SENSIBLE	INTERRUPTION OBTENUE AVEC UN EFFORT MODERE	INTERRUPTION OBTENUE AVEC UN EFFORT IMPORTANT	INTERRUPTION OBTENUE AVEC UN EFFORT CONSIDERABLE
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 4

AVEZ VOUS PERCU DES DEFAUTS (hachures, coupures, écho, bruits divers ...) DURANT LA COMMUNICATION? VOUS JUGEZ CES DEFAUTS :

IMPERCEPTIBLES	PERCEPTIBLES MAIS NON GENANTS	LEGEREMENT GENANTS	GENANTS	TRES GENANTS
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 5

COMMENT JUGEZ-VOUS LE DECALAGE ENTRE LE SON ET L'IMAGE DANS LE SYSTEME DE COMMUNICATION AUDIOVISUEL QUE VOUS VENEZ D'UTILISER ?

IMPERCEPTIBLE	PERCEPTIBLE MAIS NON GENANT	LEGEREMENT GENANT	GENANT	TRES GENANT
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 6

COMMENT JUGEZ-VOUS LA QUALITE DU SON DANS CE SYSTEME DE COMMUNICATION AUDIOVISUEL ?

MAUVAISE	MEDIOCRE	MOYENNE	BONNE	EXCELLENTE
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)

QUESTION 7

COMMENT JUGEZ-VOUS LA QUALITE DE L'IMAGE DANS CE SYSTEME DE COMMUNICATION AUDIOVISUEL ?

MAUVAISE ☐ MEDIOCRE ☐ MOYENNE ☐ BONNE ☐ EXCELLENTE ☐

(réponse dans 1 des 5 cases)

QUESTION 8

COMMENT JUGEZ-VOUS GLOBALEMENT LA QUALITE DE CE SYSTEME DE COMMUNICATION AUDIOVISUEL ?

MAUVAISE ☐ MEDIOCRE ☐ MOYENNE ☐ BONNE ☐ EXCELLENTE ☐

(réponse dans 1 des 5 cases)

QUESTION 9

AVEZ-VOUS EPROUVE DES DIFFICULTES DURANT LA COMMUNICATION?

OUI ☐ NON ☐

(réponse dans 1 des 2 cases)

QUESTION 10

COMMENT JUGEZ VOUS LA COMMUNICATION QUE VOUS VENEZ D'AVOIR ?

INACCEPTABLE ☐ ACCEPTABLE ☐

(réponse dans 1 des 2 cases)

pièce A ☐ pièce B ☐

QUESTION 11

VOUS AVEZ TROUVE LE NIVEAU SONORE DE LA COMMUNICATION

FAIBLE	PLUTOT FAIBLE	NORMAL	PLUTOT FORT	FORT
☐	☐	☐	☐	☐

(réponse dans 1 des 5 cases)