AIIC commissioned a Workload Study on interpreter stress and burnout which was completed in December 2001. The study investigated four sets of parameters: psychological, physiological, physical and performance as well as the interaction between them. The psychological aspects were examined via a mail survey questionnaire addressed to a representative sample of freelancers and all permanent members (607 replies, 41% response rate) and a booth survey (all participants in the physiological study). The physiological data collected was blood pressure, heart rate and salivary cortisol levels in a sample of 48 interpreters who wore monitors over a 24 hour period. The physical data measured was booth size, CO₂ and oxygen levels, relative humidity, temperature, lighting intensity, ventilation and fresh air flow, covering a sample of 47 booths (23 mobile, 24 permanent) in which the subjects in the physiological survey were working. The performance data was constituted by 6 segments of two minutes each, recorded at the beginning and end of an interpreter’s turns at the beginning, in the middle and at the end of the working day. The physical measurements revealed that CO₂ and temperature levels were nearly all above ISO standards and that humidity levels fell outside the ranges set by the standards. Fresh air throughput is insufficient.

The data placed simultaneous interpretation in the category of high stress professions and although no correlation was found between the physiological indices and performance levels, the data points to psychological and physiological costs. The factors most frequently mentioned as stressful by those participating in the study are difficulties to do with text and delivery (speed, read texts, strong accents, lack of background material and preparation time) and booth discomfort.

The study concludes with a series of recommendations which include remedying the deficiencies in booth conditions, better communication.

The AIIC Workload Study

Over the years AIIC has developed a set of guidelines governing working conditions which grew out of the day-to-day experience of interpreters in the booth, travelling to meetings, crossing time zones, using a variable number of languages, etc. They have been codified in various AIIC texts and have also been the subject of negotiation with institutional employers. The data on which the guidelines were based was intuitive and anecdotal rather than empirically proven and although experience in the conference room has amply demonstrated their soundness, for example the need to have at least two or more interpreters per booth, discussions with the US Federal Trade Commission in the mid-nineties came as a rude shock: the commissioners wanted hard evidence, not intuition. The Workload Study grew out of that experience but also out of a growing awareness within the profession that we had to be able to substantiate our claims regarding manning strengths, booth
The AIIC Research Committee was charged with developing a proposal which would meet this need. The proposal to conduct a study on workload in simultaneous interpretation was approved by the AIIC Council in mid-1999 and the final report, which comes to 128 pages plus appendices, was submitted to the Council in December 2001.

Consultants in the UK, Austria, Switzerland and Israel were approached and after lengthy discussion on the form and design of the project, Mertens Hoffman of Tel Aviv were selected to conduct the study. Mertens Hoffman is a large firm of management consultants with special expertise in the field of occupational health and stress management. They linked up with the Israeli National Institute for Occupational and Environmental Health for certain aspects of the AIIC study, in particular measurement of the physical and physiological data. The primary focus of the study was on investigating interpreter workload by identifying the relationship between four sets of parameters: psychological, physiological, physical and performance, e.g. do certain physical factors correlate with performance or physiological data? Does there appear to be a link between psychological findings and other parameters?

This abridged report seeks to set out the main findings of the study and the methodology used in obtaining them. The full report is available, with appendices, on the AIIC website. In the interests of brevity, this abridged version does not give references, which can be found in the full report.

I. Research Goals

The study identifies these as:

1. to map out both positive characteristics and sources of stress in the interpreter’s work
2. to characterise physical stress (air quality, noise level, etc.) in the interpreter’s work environment
3. to test the implications of the work characteristics and the interpreter’s quality of life (burnout, desire to remain in the profession, job satisfaction) and performance
4. to provide a sound basis for developing recommendations on ways of improving interpreters’ work environment.

II. Research Approach

As this study involved investigating the different facets of interpreters’ working environment, an integrative approach was adopted, combining various research methods and tools:

1. physical measurement of air quality, temperature, humidity levels in booths (physical parameters)
2. attitude questionnaire to a representative sample of AIIC members and self-report by subjects in the booth (psychological parameters)
3. recording of interpreters’ heart rate and ambulatory blood pressure (AmBP) over 24 hours + measurement of cortisol levels at different points of the day (physiological parameters)
4. sampling of interpreter performance at different points during the day (performance parameter).

The study comprised the following stages:

1. review of the literature
2. mail survey of interpreters
3. booth data collection
4. analysis of data and integration of results
5. conclusions
III. Review of the literature

The purpose of the review was to establish a baseline for the study by reviewing the literature on the interpretation task and performance, factors causing occupational stress, implications and physiological effects.

1. Interpretation Task

In simultaneous interpretation, the interpreter’s task is to convey the message of the original sender in real time, without loss of information. The task is associated with a number of constraints, the main ones being the short time segments within which the interpreter has to operate and the interpreter’s information deficit, i.e. awareness of the speaker’s intention develops only as the message unfolds so initially the interpreter has to formulate assumptions about message content. Moreover, the speaker will have assumptions about the level of background knowledge available to his/her listeners, which may not be available to the interpreter. The intensity of interpreter effort required will be a function of factors such as the communication situation, familiarity with the subject matter and textual complexity.

2. Occupational Stress

Stress consists of the psychophysiological processes cause by a perceived threat of danger. There are two psychological components:

1. the experience of a threatening and strenuous situation,
2. uncertainty as to one’s ability to cope with the situation.

There are three main category of stressor contributing to this state: environmental (heat, noise, etc.), mental (tasks requiring sustained attention, decisions, etc.) and stressors deriving from interactions with colleagues, superiors, subordinates, etc. A conceptual framework used to analyse stress is facet analysis in which the facets include duration of demand; type of demand; source of demand; interaction context (i.e. the work setting and the nature of the task); available resources (quantity and quality); type of resources (including both individual knowledge and expertise as well as equipment, work schedule, setting, etc.).

It is generally accepted that minor stress facilitates memory but occupational stress can lead to psychological distress and ill health. The literature on simultaneous interpreting mentions a number of work-related stress factors such delivery of the original message (intonation, accent, speed, gestures, etc.), level of preparation and whether a speech is spontaneous or read, length of turn and the visibility of the speaker or audience, particularly in videoconferencing.

Physical working conditions can be another source of occupational stress with factors such as poor ventilation, inappropriate lighting, too little space, poor sound playing a part. In judging the quality of the work environment, a number of physical factors can be measured. These are:

- temperature, humidity and circulation of air
- ventilation (the quantity of fresh air per person per unit of time)
- air quality involving measurement of carbon dioxide, carbon monoxide and oxygen. High CO₂ and low O₂ can increase fatigue and impair performance.
- lighting
- noise

Additional factors mentioned in the literature include task-related factors such as high levels of concentration and long hours; lack of background documents; speed of delivery; non-native
3. Implications of occupational stress

It can result in ‘burnout’, it can have physiological effects and can affect performance.

- burnout is a combination of physical fatigue, emotional exhaustion and cognitive weariness. It is also conceptualised as a process, some seeing it as the final step in a progression of unsuccessful attempts to cope with negative stress conditions. Three stages have been identified: the first is perceived stress, leading to a second stage in which the subject is affected by physical fatigue, emotional exhaustion and anxiety. The third stage is defensive coping which can lead to withdrawal and detachment. Simultaneous interpretation is agreed to be a stressful profession with a variety of stress-inducing factors that can lead to burnout, such as mental overload, which can in turn result in a change in attitude in which the interpreter disengages from the job and may demonstrate a certain carelessness. Lack of feedback can lead to a loss of motivation.
- physiological effects may be produced by cognitively demanding tasks requiring sustained attention which make heavy demands of physical energy. Signs are increased heart rate (HR) and blood pressure, especially systolic blood pressure as well as high base rates of the stress hormone cortisol, recognised as a stress marker. Studies demonstrating the presence of these factors in simultaneous interpreters have contributed to the conclusion that SI is a stressful occupation.
- performance can be affected by stressors such as speed of delivery, length of turn, uncomfortable booth conditions and high levels of physiological effort.

IV. Mail Survey of Interpreters

1. Method

A questionnaire was developed on the basis of interviews with interpreters and discussions with the AIIC Research Committee. The sampling plan divided AIIC members into two groups: freelancers and staff interpreters. Because of its small number, the latter group was included in full. The freelancers were divided into geographical clusters of more or less equal size and randomly sampled.

2. Data Collection

In total 1,502 questionnaires were sent out. To improve response rates a preliminary notice was published in the AIIC Bulletin explaining the research goals. The introduction to the questionnaire also set out the goals of the study. Anonymity was assured and a stamped and addressed envelope was included wherever possible (depending on agreements between postal authorities). Three reminders were sent to the addressees. Approximately 50 questionnaires were returned undelivered and 607 were completed and returned, i.e. 41% of those delivered. This compares with a 30% return rate is earlier AIIC surveys. The response rate for staff interpreters was lower than for freelancers: of the 256 questionnaires sent to staff members, 67 replies (26%) were received.

3. Findings

In presenting the findings of statistical analyses, SD is standard deviation (the higher the SD value, the more scattered the findings in relation to their mean). Correlation is the statistical connection between two variables, a value of 0 expresses no connection, and the measures lie between 1 and −1.
A positive correlation means that as one variable increases so does the other, a negative value that as one increases, the other decreases. Correlations of up to 0.19 are considered weak and those between 0.4 and 0.6 high. The reliability coefficient calculates the dependability of the measuring tool, it is expressed in values of from 0 to 1 and a coefficient of 0.55 is acceptable for a study of this kind. Regression analysis is used to examine the association between independent variables and a single dependent variable.

3.1. Job satisfaction

As can be seen from the chart hereunder, the factors giving interpreters the greatest satisfaction with their work were subject variety, the fact that it is challenging and work relations (all rated ‘satisfied’ or ‘very satisfied’ by more than 80% of the respondents), however only 40% rate the prestige of the profession in either of those categories and only 42% put travel at that level.

[Chart: Satisfaction with Various Factors at Work (Percentage of respondents who answered: "very satisfied" or "satisfied")]

Staff and freelance interpreters were asked different questions about satisfaction with job characteristics: freelancers were asked about flexibility (89% satisfied) and having no boss (93%), while staff interpreters were asked about how they saw chances of moving up through the professional hierarchy (24% satisfied, 48% dissatisfied), job security (78% and 15% respectively) and their current workplace (63% satisfied, 13% not).

3.2. Stressors

The factors mentioned most frequently were fast speaker (78% of all respondents), speaker reading from text (71%), frequent change of subject matter (64%) and lack of background material (60%). Frequent travel was mentioned by 47%. When asked to rate various factors for their perceived level of stressfulness, fast speaker was rated highest, followed by reading from text, poor equipment, difficult accents, booth discomfort, poor visibility of speaker and visual aids, lack of background material, textual complexity, too little time to prepare, undisciplined speakers (poor mike discipline, interrupting one another) and uncomfortable seating, in that order. In order to obtain a clearer picture of the stressfulness of various factors, the ratings of stressfulness for specific job characteristics were multiplied by their frequency levels which shows that the most salient stressors are speakers reading from text, fast speakers, lack of background material, difficult accents, booth discomfort, poor preparation time and undisciplined speakers. In reply to an open-ended question on additional stressors, 20% of the respondents mentioned travel logistics, 16% prolonged periods of extreme concentration and 13% being asked to cope with extra work, e.g. unforeseeably prolonged meetings or translations. Freelancers encounter poor booth conditions, frequent travel and having to work into a ‘B’ language more often than staff members.

3.3. Annual number of days worked

The mean for freelancers is 100 (SD 41) and for staff interpreters 167 (SD 59), the higher the number of days worked, the higher the level of satisfaction. Only 25% of those working 1-70 days a year were satisfied or very satisfied whereas 81% of those working between 121-365 fell into that category. A question about satisfaction with the average worked each year showed that at a mean of 126 days (SD 47), interpreters were highly satisfied, at a mean of 96 days (SD 43) they were moderately satisfied and at a mean of 71 days (SD 43) satisfaction was low. A low positive correlation was found between the number of days worked and burnout.

4. Outcomes
The questionnaire asked three questions designed to ascertain levels of satisfaction with the profession. 88% replied that they were either satisfied or very satisfied with the work, 69% that they expected to be in the same profession in two years time and 51% that they would recommend the job to a friend. Only 10% thought that their chances of being in the profession in two years’ time were low but 23% would not recommend it to others.

4.1. Performance

66% of the respondents replied that they were satisfied with their performance either to a great or to a considerable extent, 31% to a moderate extent and only 3% to a slight extent or not at all. Between 40%-60% reported a drop in performance levels when subject to work-related stress, particularly with regard to accuracy and overall quality of work. 66% reported high or very high levels or work-related stress, 40% see it as positive and 36% as harmful. 70% considered that they dealt with stress successfully and 6% unsuccessfully. The remaining 24% considered that they were neither successful or unsuccessful.

4.2. Private Life

34% of the respondents felt that their family life suffered to a moderate extent from their work, 20% that it suffered to a high extent and 36% to a low extent. 43% had largely enough time for personal activities, 40% moderately so and 17% to a low extent.

4.3. Discomfort at work

53% of the respondents say they encounter tiredness at work, 52% throat irritation and dryness, 35% drowsiness and 31% backache. Other factors mentioned are eye irritation, concentration, headaches, coughing and lethargy. 10% of the respondents consider that they encounter these discomforts most or all of the time, 70% replied some of the time and 20% rarely or never.

4.4. Burnout

Levels of burnout in interpreters were compared to those of teachers, high-tech workers and senior Israeli army officers, using three indices (mental and physical exhaustion, cognitive fatigue and mental stress) derived from the questionnaire. Interpreter mental stress levels were the highest of the four groups and also the highest of the three indices. Cognitive fatigue was the index with the lowest value. Staff interpreters reported more burnout and mental/physical exhaustion than freelancers.

4.5. Videconferencing

is perceived as raising stress levels and reducing the quality of interpretation. It is also perceived as reducing physical comfort. A number of interpreters who had never worked in this mode (85) rated it poorly, indicating that it has a negative reputation.

Most of the outcomes are correlated but the correlations are low. Regression analysis shows that the variables which accounted the most for overall satisfaction are professional status, non-routineness, satisfaction with frequent travel and not acting as ‘pivot’.

V. Physiological Parameters

Measurements were taken at eight conferences in the London, Munich, The Hague and Tel Aviv.

1. Aims

- to measure subjective appraisal of stress,
- to measure the corresponding objective physiological stress responses (AmBP and HR, stress
hormone cortisol),
● to compare these parameters with the levels for other workers in high stress jobs.

2. Methods

Population: the sample consisted of 48 interpreters, 35 women & 13 men. 3 of the women and 2 of the men were hypertensive. Only one of them was aware of it. 27.1% were smokers. Tranquillizers were used by 8.6%.

Measurements: 3 types of data were collected for each subject: AmBP and HR with a diary (time log) record of the concurrent workload, salivary cortisol levels. AmBP and HR were measured over 20-24 hours using a mobile monitor (Accutrack II). Salivary cortisol samples were collected 4 times: after waking, at 11 a.m., 4 p.m. and 9 p.m.

3. Results

The diary record made it possible to distinguish between feelings of high workload and tension at different times during the working day and at rest. Over 90% of the subjects reported a high workload rating when ‘on mike’ which persisted when ‘off mike’. 60% reported high tension when ‘on mike’, with women reporting higher ratings than men.

3.1. Cardiovascular response

In the sitting (i.e. work) position, the highest AmBP and HR values in both men and women were recorded when ‘on mike’. When the results were compared to values reported by another researcher (Van Egeren) for university employees in both high strain and low strain jobs, the values obtained for normotensive interpreters corresponded to those for high strain jobs. There number of hypertensives was too small to allow for a similar comparison. Subjects who self-reported high levels of tension recorded higher AmBP and HR values than the ‘low tension’ group.

3.2. Salivary Cortisol

While average cortisol levels by time of day show the expected circadian secretion, cortisol levels after awakening (i.e. baseline levels) resemble those established for high stress groups in an earlier study (Schulz). The levels for subjects in the ‘high tension’ group were much higher upon waking than for the ‘low tension’ group (31.01 as against 18.38). The earlier study found that stress at work is associated with elevated morning cortisol.

4. Conclusions

4.1 As these results constitute an aggregated measure of physiological responses from 48 interpreters in four countries, they are likely to reflect the stressfulness of an interpreter’s work.

4.2 AmBP and HR measurements, together with subjective ratings or workload and tension over a 24 hour period, demonstrated the stressfulness experienced by interpreters. The subjective ratings of workload and tension were validated by the cardiovascular data. Women showed higher response levels than men.

4.3 BP values observed in the study are comparable to those obtained for workers in other high stress occupations.

4.4 The same is true of salivary cortisol levels. Earlier studies suggest that chronic stress manifests itself in high cortisol levels upon awakening, regarded as the best indicator of baseline cortisol.

4.5 As a similar trend was observed for both cardiovascular responses and cortisol levels, this indicates high convergent validity of the conclusions drawn. They are also congruent with the
subjective ratings of high workload and levels of tension, thereby providing objective verification of the stressfulness of the interpreter’s job.

VI. Physical Parameters

The aims of this part of the study were to characterise the physical conditions under which simultaneous interpreters work; measure the environmental conditions (climate, ventilate, noise, lighting, concentration of gases); analyse the findings and compare them to international standards (ISO); formulate conclusions.

A total of 24 permanent booths were covered (10 in London, 3 in Munich, 11 in The Hague) and 23 mobile booths (13 in London, 5 in Israel, 5 in Munich), making a total of 47.

1. CO$_2$ Levels in Booths

The dimensions of the permanent booths varied but not widely. The mobile booths were all in accordance with the relevant ISO standard.

1.1. Mobile booths

Mean CO$_2$ levels in mobile booths were close to the level rated ‘unacceptable’ by ISO (i.e. above 1000 ppm) after 1.5 hours and remained at that level for the rest of the day with a peak to above 1000 ppm after 3 hours. The average value over the working day (1.5-6.0 hours) was 992.3, i.e. very close to ‘unacceptable’. The highest mean value recorded for the working day was 1775 ppm. The percentage of ‘unacceptable’ booths was 37% and of ‘poor’ booths (801-1000 ppm) 42%, i.e. 79% of all mobile booths measured were either unacceptable or poor by ISO standards.

1.2. Permanent booths

The situation was better but still in the range rated ‘poor’ by ISO. The mean value over the working day was 870.8 with the highest mean value for the day being 1375 ppm. 33% of the booths were rated ‘unacceptable’ and 27% ‘poor’, i.e. 58% in total. The corresponding mean values for permanent and mobile booths together were 927 ppm over the working day, 29% rated ‘unacceptable’ and 34% rated ‘poor’, totalling 63%.

2. Oxygen levels

Normal in all the booths, remaining constant throughout the day.

3. Relative humidity

Levels of between 50% and 60% are considered good, 45-65% is acceptable whereas values either above or below this range are considered uncomfortable. 100% of the mobile booths were in the ‘uncomfortable’ range after 6 hours and 48% of the permanent booths, although the average humidity was 47%, i.e. just inside the recommended range. This discomfort was due to very low humidity, causing a sensation of dryness.

4. Temperature

The recommended temperature comfort zone is between 20-21°C with values below 18°C and above 22°C deemed uncomfortable. 100% of the mobile booths reached uncomfortable levels after 3 hours, 95% after 1.5 hours (mean value over the working day: 24.4), while 77% of the permanent booths were in the discomfort range over the working day (mean value 22.7), 71% after 3 hours.

5. Air velocity
Expresses the speed at which air flows at face level, 11-13 m/min is considered the most comfortable and the range 6-15 m/min is acceptable. Values outside these limits are unacceptable. Values measured in 87% of the booths were unacceptably low, giving rise to complaints of ‘stale air’.

6. Lighting

In most cases it was found that although the potential illumination was sufficient to meet the standard, in 100% of the cases measured interpreters chose to work with insufficient light. Although many dislike the ‘fishbowl’ effect, working with insufficient light could cause eye strain and add to tension.

7. Ventilation and fresh air flow

These are assessed according to the percentage of fresh air blowing into the booth, the number of air changes per hour and the volume of fresh air per person per time unit. In mobile booths the number of air changes per hour (7) was sufficient but the volume requirement per person per time unit was not met. In permanent booths the frequency was insufficient. Attention is drawn to the need for fresh air to come from outside rather than be recirculated air which contains higher levels of CO$_2$ and water vapour.

8. Conclusions

A large number of booths do not meet ISO standards for CO$_2$ levels, relative humidity and temperature. The problem is particularly acute in mobile booths but also arises in permanent booths. Ventilation, fresh air flow and air velocity are inadequate.

9. Recommendations

- larger mobile booths;
- ventilation systems for permanent booths which are independent of the conference hall system;
- airflow at a velocity of 9-15 m/min;
- efficient temperature and humidity regulators in booths;
- ventilation systems should be switched on 1 hour before the start of meetings and left on all day;
- booth doors should be left open during breaks and overnight;
- booths should be regularly cleaned, including seating and carpets;
- lights should be turned off when the booth is unoccupied as they are a source of heat.

VII. Performance Evaluation

1. Method

Performance data was sampled three times in the course of the working day: at the beginning and end of three interpretation turns occurring at the start, in the middle and at the end of the day. The corresponding original was also recorded. Each sample consisted of two segments of 2 minutes, one from the start and the other from the end of the period. The original and the interpreted samples were transcribed. Each interpretation was evaluated by two jurors, professional interpreters, having the same languages as the interpreter. The parameters evaluated were: error rate, omission rate, addition rate, grammatical mistakes, word choice, phrasing and delivery. Each was evaluated on a scale from 1 (very unsatisfactory) to 5 (very satisfactory). Recordings were made of 42 interpreters, working in 23 booths. Nearly all the interpreters recorded were also being monitored physiologically. The exceptions were due either to medication or a reluctance to be wired up for 24
hours.

2. Results

The mean values for performance quality were very consistent throughout the day, with the lowest being 4.12 (first segment in end-of-day sample, SD .53)) and the highest 4.46 (first segment of the day, SD .33). This shows a slight tailing off in performance towards the day’s end. Concordance between jurors was high with significant differences occurring in only 11% of the evaluations.

3. Correlations

There do not appear to be any with the physiological and physical data measured although AmBP and HR values were highest when subjects were ‘on mike’ and high levels of blood pressure ‘on mike’ showed a weak correlation to self-reported negative effects of stress on performance. No connection was found between CO₂ levels and performance quality although low humidity correlated weakly with a lower performance evaluation, as did working in mobile booths. High reliability coefficients were found for all the sample parts, which reflects a weak distinction between the evaluations of the different parameters. Although the correlations between measures of stress (objective and subjective) and performance are weak, this is in keeping with findings in the literature which indicate that highly competent and motivated workers maintain high levels of performance in the presence of a variety of stressors. Other studies show that there are physiological costs associated with maintaining these high levels in such conditions: physiological exhaustion and post-work stress. This study shows that interpreters are subject to these costs: high awakening cortisol levels and high AmBP when working, as well as self-reports of negative effects on physical well-being.

4. Conclusions

4.1 Interpreter performance was highly rated (4.12-4.4 on a scale from 1-5, 5 being the highest mark) with a slight decline towards the end of the day.

4.2 Agreement between jurors was good with significant differences in only 11% of the cases assessed.

4.3 It can be argued that the fact that the correlations between performance and stress are weak, is evidence of coping strategies having been developed by the interpreters. There may be physiological costs associated with these high performance levels in the presence of stressors.

VIII. Attitude Questionnaire for Booth

The purpose of the attitude questionnaire was to reflect the self-assessment of the interpreters during their working day and their attitudes towards the meeting parameters. All of the interpreters who were physiologically monitored (and whose booths were measured for physical data) were asked to complete the questionnaire at the end of the workday. Some additional interpreters, in the booths examined but who were not monitored, were also asked to complete the questionnaire. A total of 52 questionnaires were received.

1. Sample representativity

The average age of the mail survey population was 49.2 years, with 21.6 years in the profession. The booth sample’s average age was 45.5 years with 16.7 years seniority. The gender breakdown of the first group was 76% women, 24% men with a burnout value of 3.1; the second group was 68% women and 32% men with a burnout value of 3.3.

2. Findings
2.1 Half of the interpreters surveyed reported that the meeting was technical. 51% had mainly interpreted discussions and 23% speeches. 62% said the meeting subject matter was familiar but only 1/3 found it interesting.

2.2 When asked about number of turns during the day, 39% had done two to three; 20% four; 19% five and 22% had done six or more. 69% of the turns were 30 minutes long, 6% 32-45 minutes and 23% up to 25 minutes.

2.3 64% reported being on mike continuously (or almost) throughout their turn whereas 11% were on mike very little during their turn. 75% did not use relay and 81% did not work as ‘pivots’.

2.4 81% received material in advance of the meeting and 42% received at least some of the speeches that were delivered. About half the subjects reported that they had not had sufficient time to prepare the meeting.

2.5 When asked to rate the factors that had contributed towards a positive attitude to the working day, 94% said that boothmates had contributed to a great or considerable extent, 63% mentioned the importance of the subject, 63% referred to doing a good job and 37% to the subject being interesting.

2.6 67% of the respondents had worked in permanent booths on the day the measurements were taken, 33% in mobile ones. When asked about level of perceived comfort, 19% of the subjects in mobile booths rated the physical conditions as falling in the two best categories as against 49% of those in permanent booths. In mobile booths, 33% rated seat and body posture in the two top categories (compared to 62% in fixed booths); 13% as against 68% speaker and visual aid visibility; 69% versus 86% ease and comfort of equipment; 19% as against 69% were satisfied with booth size and 6% versus 57% with the available work surface.

2.7 77% of the interpreters in fixed booths and 73% of those in mobile booths complained of stale air,

2.8 44% of the subjects reported having had a difficult or very difficult workday, this was more pronounced for the interpreters in mobile booths.

3. Burnout

The questionnaire comprised questions from which it was possible to develop a burnout index. Lack of energy and tiredness were the most common components. The subjects of the study showed relatively high burnout levels on the workday compared to levels for other professions and to the data obtained from the mail survey. This appears mainly related to difficulties of delivery and text.

4. Stressfulness

Factors that were reported as contributing to stress were: fast speaker (54%); textual complexity (50%); subject of meeting (48%), speaker reading text (34%); difficult accent (31%) and booth discomfort (24%). Almost half the subjects reported a decline in their performance during a stressful turn as compared to a ‘normal’ turn. A decline in performance was more frequently reported by subjects in mobile booths.

5. Conclusions

5.1 After analysis of the data, the main causes of a stressful turn appear to be difficulties in text and delivery, poor booth conditions and number of turns on that day. The number of turns is negatively related to performance quality.

5.2 Relatively high levels of burnout were reported at the end of the working day.
5.3 Although mobile booths were reported to be uncomfortable, there was also criticism of physical conditions in permanent booths. In both, interpreters complained of 'stale air'.

5.4 A part of the data obtained from the booth survey is comparable to that from the mail survey, suggesting that it may apply to the general interpreter population.

IX. Integration of Booth Data

The performance data was crossed with the physical and physiological data to examine the ties between the three sets of parameters. The physiological indices (blood pressure on and off mike and cortisol levels) were not found to correlate with performance levels. High levels of blood pressure on mike were found to be related to negative effects of stress on performance ($r = 0.39$).

No connection was found between CO$_2$ levels, temperature and air velocity in the booths, on the one hand, and performance on the other. Low humidity was found to be related to a lower performance evaluation ($r = 0.40$). Interpreters who reported less comfortable booth conditions received a lower performance evaluation ($r = -0.29$). A lower quality of performance was found in mobile compared to permanent booths ($r = -0.43$).

Blood pressure on and off mike did not relate to interpreters’ self-reports of tension and burnout but there was a weak link between cortisol level and reporting ‘toll on private life’ ($r = 0.33$) as well as with lower levels of satisfaction ($r = 0.28$).

It is important to note that the booth data is based on a relatively small sample collected at different conferences resulting in a number of potentially interfering factors, which have not been measured in this study.

X. Summary

1. Stressfulness

Comparison between interpreters and known high stress professions leads to the conclusion that simultaneous interpretation falls into that category and that burnout levels are high. Blood pressure values were similar to those for other high strain jobs, attesting to the stressfulness of interpreters’ work. An indirect manifestation of this was found in the objective and subjective stress measurements when the interpreter was ‘on mike’, which is when the highest tension and workload rating were reported. The subjective rating were validated by cardiovascular data (systolic and diastolic AmBP and HR).

The mail survey revealed that approximately half the respondents perceive their work-related stress as useful and positive while 30% consider it harmful. The main factors contributing stress can be grouped under three headings: 1) textual and delivery difficulties; 2) poor booth conditions; 3) preparation difficulties.

2. Booth conditions

The study of the physical parameters indicated that:

a. The supply of fresh air to the booths is insufficient leading to a consequent increase in CO$_2$ to levels above recommended values. In 29% of the booths, average CO$_2$ levels were ‘unacceptable’ and in an additional 34% they were rated ‘poor’ (according to ISO standards).

b. Relative humidity was below recommended levels: 89% of mobile booths being rated ‘uncomfortable’ and 45% of fixed booths.
c. Velocities of airflow at face level were below recommended values.

d. Temperatures in both booth types are higher than recommended, especially in mobile booths.

e. The combination of high environmental temperature and low relative humidity in booths
causes feelings of dryness, heat and lack of ventilation in mobile booths. In permanent booths,
it can cause sensations of chilliness and lack of ventilation.

f. The level of lighting in permanent booths is insufficient.

g. There is insufficient workspace for two people in mobile booths and for three people in
permanent booths. ‘Overcrowding’ results in raised temperature and CO\textsubscript{2} levels. Ventilation
systems were inadequate.

h. Concern about booth conditions was reflected in the mail survey and contributes to stress
levels. 20% of the respondents complained about uncomfortable seating and work surfaces.

3. Performance

a. Jurors gave performance a high rating. There was a slight decline towards the end of the day.

b. Performance in mobile booths was rated lower than in permanent booths. This could be
because conferences using mobile booths tend to be ‘one off’ meetings, those in permanent
booths are more likely to use a regular team, familiar with the subject. In general, interpreters
reporting greater booth discomfort received lower ratings (r = 0.29).

c. Interpreters reporting higher stress levels during the workday, received a lower rating (r =
-0.27).

d. In general, physical and physiological values were not found to be related to performance,
with the exception of low humidity which was related to a lower performance rating (r = 0.40).

e. In both the mail and the booth surveys, around half the respondents reported a drop in
performance as a results of work-related stress.

f. The following work-related stressors appear to have a negative effect upon performance:
delivery, poor booth conditions, lack of preparation time.

g. The literature reports that meaning errors in simultaneous interpretation rise considerably if
interpreters work for long uninterrupted periods. They do not seem to be aware of this,
consequently after increased time on task interpreters, whether novices or experts, are not
reliable judges of the quality of their output.

4. Effect of stress on performance

While a more substantial correlation between measures of stress and performance levels might have
been expected, the literature does not show consistent evidence of stress having an adverse effect
upon performance. This may be due to the presence of two moderating variables: competence and
motivation. Research indicates that highly competent workers are likely to maintain a high level of
performance in the presence of stressors such as role overload, role ambiguity, role conflict and
resource inadequacy. Simultaneous interpreters are highly skilled and motivated to perform well
given that their work is continuously monitored by their listeners. Research shows that this comes at
a cost: physiological exhaustion and post-work stress. The physiological data in this study reflects
that physiological cost (self-report of tension, high baseline cortisol levels, elevated cardiovascular
values during work) in the subjects measured.

5. General satisfaction

Respondents report high levels of general satisfaction with their profession although only half would
recommend it to a friend. They perceive a decline in the prestige of the profession in recent years.

XI. Recommendations
While a number of these recommendations are already part of AIIC’s recommended practice, they are repeated here for completeness:

1. In order to reduce stress due to poor delivery, read texts, etc. AIIC may find it useful to formulate recommendations for speakers to the effect that they speak their mother tongue wherever possible, that they minimize the reading of written texts, that background material and written speeches be distributed to the interpreters in advance of the meeting, that means be installed to enable interpreters to signal problems to speakers.

2. Give interpreters as much advance notice as possible regarding forthcoming assignments, especially if they involve travel.

3. Limit the number of turns an interpreter does in a working day to prevent a decline in performance due to exhaustion.

4. Make sure that booths are large enough for the number of interpreters to be accommodated in them (ILO standards stipulate 6 sq. m. per worker).

5. Ensure that the airflow into booths provide for seven changes an hour (ISO standard) and that the air supply be 100% fresh (not recirculated) air.

6. Temperature and humidity regulators should be installed in each booth and regularly maintained.

7. Ventilation systems should be turned on one hour before the start of a meeting and left on all day.

8. Although interpreters may choose to work with low levels of light (to avoid the goldfish bowl effect), levels in permanent booths are below ISO standards and ways of providing adequate lighting that avoid undesirable effects should be explored.

9. 10 AIIC may wish to investigate the reasons for the recent perceived decline in the prestige of the profession and propose remedies.

1. Many of the reliability coefficients established fall below this level

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Recommended citation format: