Assessing the recall bias with regard the laterality of cell phone use

Peter Wiedemann, Franziska Börner & Fred Freudenstein

Background

One of the critical issues in the evaluation of epidemiological studies is the recall bias (Coughlin 1990), which might also effect studies on mobile telephone use. In addition to the duration and frequency of telephone calls (Vrijheid et al. 2009), the side of the head on which the phone was used can also be prone to a bias (Inyang et al. 2010).

From a psychological viewpoint it can be expected that the subjective illness model of people suffering from a tumour (which includes knowledge regarding the laterality of the tumour and beliefs about its cause) leads to an overestimate of the number of calls made on the side of the head where the tumour is located. The hypothesis is that knowing the location of the tumour is an anchor, which leads to an overestimation of the phone calls on the tumour side, if one believes that mobile phone use has caused the tumour. Such a bias is not expected in healthy individuals.

Methods

The first study did not conduct an experiment with tumour patients and health controls but for ethical reasons designed a simulation experiment using healthy volunteers. It was framed as probability learning task. The experimental subjects (Ss) watched the calling-behaviour of an avatar in a computer animated experiment and had to predict whether the line was occupied or free. After a distraction task they then needed to indicate how often the avatar used the phone on the right and on the left side of its head. In one group, the Ss were given the information that the avatar suffered from a tumour (experimental group), the other group received no such information (control group). Furthermore, the objective frequency of the avatar's side-specific mobile phone use was varied as a continuous variable in the experiment.

A second experiment, conducted in 2011, improved the experimental set-up:

- The involvement of the Ss in the simulation study was increased. The Ss no longer observed an avatar making phone calls, but watched the call-situation on a PC screen from an "Ego-perspective" (see Figure 1).
- A video was produced to induce the subjective illness model (EMF causes tinnitus), in which a "medical expert" legitimized this causation. The control group received a neutral video.
- The success of inducing the subjective illness model in the experimental group was tested (manipulation check).

A simulation experiment was conducted in individual sessions. The procedure was the same as in the first experiment. First, Ss were instructed that they had to solve a probability learning task, i.e. to predict whether they would hear a free or an engaged ring tone when making a phone call. Each subject made a total of 20 calls with 50% of the calls held to the right side of the head and 50% held to the left. The ratio was always 70% free to 30% busy. This frequency variation was randomly assigned over the trials.

The Ss (N = 75) were assigned to one of three groups that received different information in the video. Group 1 was asked to imagine that they suffered from tinnitus on the left-hand side; members of group 2 as if they suffered from tinnitus on the right-hand side. The control group (group 3) received no such information; here, a neutral video was shown. Afterwards, Ss had to indicate how often they held the phone to the left or right side of their head.

Results

The first study showed a levelling effect in respect of the frequency of side-specific phone use that could be recalled. The Ss overestimated low objective frequencies and underestimated high objective frequencies. However, no differential effect could be found between the control and the experimental group.

The manipulation check (second study) revealed that Ss of the experimental group believed significantly more often that using mobile phones causes tinnitus ($p = 0.001$). Furthermore, Figure 2 indicates that our Ss recalled the right/left distribution of the phone calls quite correct. However, an ANOVA did not show significant differences in the estimated frequency of laterality between the control and experimental groups ($p = 0.436$). Similarly, the handedness of the subjects had no effect ($p = 0.222$) on participants' recalled side-related frequency.

Discussion and Conclusions

In sum, the data does not support the conjecture of a differential recall bias. However, it cannot be ruled out that the distraction-period was too short for inducing a differential recall bias. A recall bias might only occur after a certain latency period, because the recall bias rises with increasing uncertainty about one´s behaviour in the past (cf. Couhlin 1990).

Literature:

Coughlin, S. (1990). Recall Bias in Epidemiologic Studies. *Journal of Clinical Epidemiology*. 43 (1), 87-91.

Inyang ,I., Benke G.P, McKenzie R., Wolfe, R., Abramson, M. J. (2010). A new method to determine laterality of mobile telephone use in adolescents. *Occupational and Environmental Medicine.* 67 (8), 507 - 512

Vrijheid, M., Armstrong, B.K., Bedard, D., Brown, J., Deltour, I., Iavarone, I., Krewski, D., Lagorio, S., Moore, S., Richardson, L., Giles, G.G., McBride, M., Parent, M.E., Siemiatycki, J., Cardis, E. (2009). Recall bias in the assessment of exposure to mobile phones. *Journal of Exposure Science and Environmental Epidemiology*. 19 (4), 369–381.

Fig. 1: Screenshot of the simulated call situation

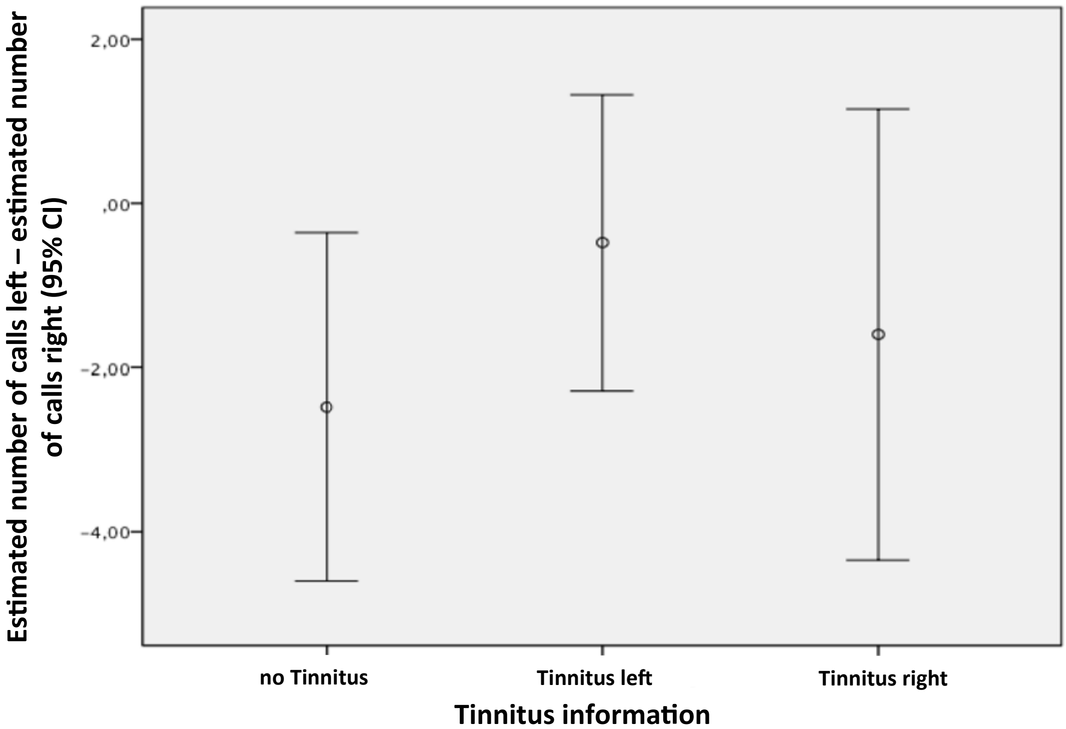

Fig. 2: Distribution of frequency estimates of side-related mobile phone use for all three experimental groups

The variable "Estimated number of phone calls left minus estimated number of phone calls right" was created. A negative value shows that participants have a tendency to recall more phone calls on then right side. (i.e. , a maximum of 20 answers right and 0 left results in a score of -20) and vise versa.