Investigating Shared Space Interaction to inform the design of an Intelligent Mobility Aid for Older People

Interview with Christopher R Wilkinson

So what did you investigate as part of the DALi project?

The DALi project is looking at ways to develop an intelligent mobility aid for older people. To provide system intelligence, we need to understand how people interact in confined environments, how they negotiate shared space, and how they behave in relation to other agents in shared space. ***If we can predict likely behaviours, we can suggest alternatives that avoid collision.***

We wanted to establish a repeatable and consistent approach that could be used, later, in other environments with a wider sample of participants including older people. A simulated shopping activity was devised in a laboratory and to gain human centred input we asked participants to verbalise the routes they chose and decisions they made as they completed shopping tasks.

Tell us about these papers

Designers have been accused of failing to engage with users in the design process, and this can compromise commercial opportunity and reduce the interactional experience for users. These papers looked at how a Participatory Design approach can be used to overcome this problem and was applied to the Dali Project and also a project in the UK investigating new product opportunities in the active wheelchair user market. In terms of the DALi project, the papers describe how ***we developed a methodology to establish how people interact within shared space.***

What did you find?

Shopping for convenience appeared to exert an influence on shopping behaviour with a significant proportion of participants deviating from the list provided. ***Participants often shopped either for the nearest items*** or to avoid other participants positioned at shopping stations, returning later to complete the task.

Analysis of critical instances, pre-defined as any reference to physical, visual or auditory agent-to-agent awareness or interaction, revealed that ***participants exhibited Active and Reactive Behaviours.*** Active behaviours were the behaviours employed to understand the environment and determine strategies toward task completion, environmental awareness and negotiation, and mainly focussed around the visual modality:

1. Eye-to-eye negotiation of immediate shared space interaction
2. Use of peripheral vision in assessment
3. Visual scanning of environment
4. Verbal interaction

Alternatively, Reactive behaviours were considered as the reactions of agents in the environment to other agents; the physical reactive movements made to accommodate other agents and successful interaction:

5. Waiting for free space or desired location to become clear
6. Stepping backwards to allow others more room/free space
7. Moving forwards to allow others more room/free space
8. Stationary agent yielding to moving agent
9. Move left
10. Move right

About Christopher R Wilkinson

Dr Christopher R Wilkinson is the Research Officer for the National Centre of Product Design and Development Research in the United Kingdom. His Postgraduate and PhD Research at the University of Cambridge was supported by the EPSRC and he was subsequently selected for a Research Associate position in HCI at the University of Trento, Italy. In 2014 he was appointed by the European Commission as an Independent Expert Consultant on Human Computer Interaction, Usability, and User Experience.

As a User Experience Specialist, previous collaborations have involved research with manufacturers such as Porsche AG and Jaguar Cars, and he brings expertise in the field of User Centred and Inclusive Design to PDR. His research interest focuses on how products can be designed and developed for a wider audience and particularly those with cognitive and physical impairment. Since his arrival in August 2013 he has been involved in numerous commercial projects, has three further articles accepted for publication, and maintains international research collaboration links with academic institutions in the United Kingdom and Europe.

The involvement of potential users of the device throughout the experimental and design stages also ensures we receive design insights that can contribute toward the development of a usable and user friendly mobility aid for older people.

How will these findings be applied in the future?

The experimental work reflects preliminary attempts to determine an appropriate methodology for observational studies, and to gain an understanding of the technological requirements in terms of experimental data capture. Determining how we may consistently document the most frequently occurring behaviours informs us about how subsequent data capture may be performed in more ecological settings involving older participants.

What impact do these findings have on the current research?

The data will influence the development of the mobility aid's intelligence engine using Helbing's (2002) Social Force Model. This model represents human behaviour in the presence of obstacles and other people, and permits simulation and modelling of several aspects of people and the environment. It recognises that, as is often the case in the real world, individuals attempt goal achievement via the most efficient and economical route, and that ***the presence of obstacles and other people influences human behaviour.***

What's next?

Future studies will involve a wider sample and the intention remains to include older able-bodied and less-able bodied participants, both within experimentation and also within the larger participatory design process. Research is ongoing with the involvement of tracking technology that permits a more scientifically accurate and consistent indication of when two, or more, agents share the same immediate interactional space and may be used to explore the exact behaviours exhibited and employed. (see ***http://www.ict-dali.eu/dali/news.html).***

Where can we learn more about this work and these projects?

More details about these projects are available within the following publications:

Wilkinson, C. & De Angeli, A. (2014). Demonstrating a Methodology for Observing and Documenting Human Behaviour and Interaction. 13th International Design Conference (Design 2014), Dubrovnik, Croatia. May 19th-22nd. (in press).

Wilkinson, C. & De Angeli, A. (2014). Applying User Centred and Participatory Design Approaches to Commercial Product Development. Journal of Design Studies. 2014. (in press).

What are you up to currently?

Both authors are actively involved in user centric and user centred design, and acknowledge the importance of considering users as individuals, with individual needs, capabilities, and desires, throughout the design process. Participatory and Inclusive Design approaches are at the core of their research and are applied in on-going living-lab projects in Italy, and in commercial research and design activity in the United Kingdom.

The authors maintain an interest in the cognitive, social, and cultural, aspects of ICT and Interaction Design, and the DALi project continues to develop with great advances having been made in terms of monitoring and mapping individual behaviour in shared space. This new knowledge will be incorporated into the development of the mobility aid's prediction engine in the near future.