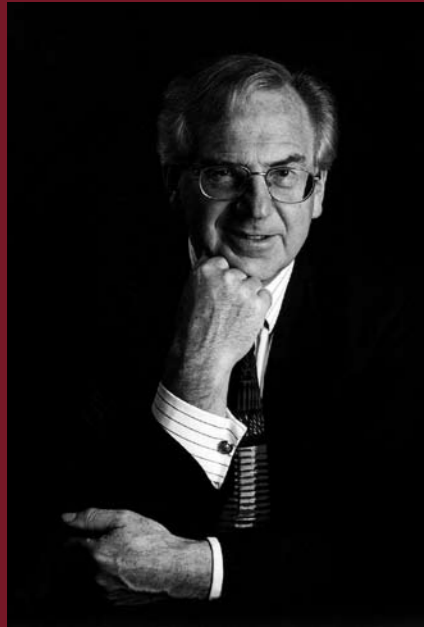


# Ageing research going places



Strategic Promotion of Ageing Research Capacity

# Preface



The exploitation of scientific research has contributed greatly to quality of life and longevity in the United Kingdom. As more people live longer, there are new challenges for science, but despite their importance to society many of these challenges do not figure in the priorities of science policy makers or scientists.

Thus, I am very pleased to introduce this compendium of recent research by newcomers to ageing research. It shows the role which they are playing to ensure that older people, their families, and those who work with and for them, get their fair share of the benefits of British science and technology.

Under my chairmanship, the House of Lords Science and Technology Committee has raised many demanding questions about the character of ageing research in the United Kingdom. Against this backdrop, and with modest funding, SPARC has provided a simple but valuable model. It places older people, their needs and aspirations, at the centre of the research process; encourages researchers to rub shoulders with those who can use and benefit from their work; and goes out of its way to lobby policy makers about the contribution by research which can be made to the quality of life of older people and society.

SPARC is just the first step in developing a new culture of ageing research – it has laid the foundations, but more steps have to follow and enthusiasm has to be sustained. So far the news is good. The findings from some of the projects described here are working their way into policy and practice, and many of the SPARC award holders have already secured follow-on awards. Of course SPARC hasn't solved all the problems faced by ageing research, but it has provided a model which has been enthusiastically welcomed by researchers, professionals and older people. Most of all, it has brought to the field the prerequisites of top-class research – excellent scientists with abundant energy, inquisitiveness and commitment. I look forward to following their careers.

Lord Sutherland

# Older people going places

Since 2005 SPARC has been encouraging scientists to become involved with the many issues faced by an ageing society and encountered by older people in their daily lives.



## Funding research

As a first step, SPARC provided small funding awards to 34 newcomers to ageing research from across the areas of design, engineering and biology. Their SPARC-funded projects often required interdisciplinary and multi-professional collaborations, and many involved older people directly as advisers and experts in growing old. SPARC has provided modest funding to meet the costs of research staff, consumables, equipment, travel and provided encouragement through mentoring, access to prestigious dissemination platforms, professional editorial assistance, involvement in international activities and many useful contacts. The host institutions, partners and collaborators have also contributed significant advice, time and money.

## Dissemination

Research is of little value unless it is communicated to those who can use and benefit from it. SPARC has run over 40 Workshops across the UK to showcase ageing research and underline the realities of growing older. As a consequence it has built a community of nearly 2000 supporters which includes professionals and practitioners involved with housing, health and social services, voluntary agencies, local and central government, industry and commerce, and of course, older people and scientists. Added to this is a regular stream of publications, summaries of the SPARC projects and news items, all available through the SPARC website [www.sparc.ac.uk](http://www.sparc.ac.uk).

## Advocacy

Policy makers also need to know about the benefits for individual older people and society which can be achieved by ageing research. SPARC has gained the ear of ministers, politicians and leaders of industry, and is working closely with government departments. It has presented evidence to parliamentary enquiries, has represented the interests of the UK at international meetings, and has been particularly successful in developing long-term international collaborations. Yet, it has been equally at home meeting with professional bodies and local community groups.

## Looking to the future

SPARC is eager for change. It is challenging conventional wisdom about the face and the pace of ageing research by injecting vitality and new blood into ageing research. Through this, it is building national capacity for ageing research and strengthening the links between researchers, practitioners and policy makers to appeal to all of those who are interested in extending the quality of life, health and independence of older people. It is making a tangible contribution towards ensuring that older people receive the full benefits from the best that research can offer.

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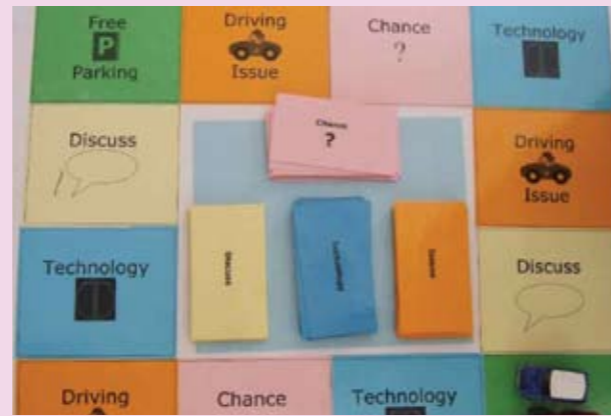
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This brochure was originally produced for the BA Festival of Science 2008

# Getting out and about

Being able to get out and about and use public transport to access many different services and facilities, is fundamental to independence and quality of life. Yet the poor design of streets and urban infrastructure can be very isolating, especially where there is a fear of crime. Working with local and regional government agencies and with older people, SPARC is developing new tools for urban planners, to help create safe streets and open spaces

Planning a viable public transport system that meets the needs of older people in terms of routes, timetables and quality of service is extremely complex and requires a close rapport with users. SPARC is developing new approaches for transport planners to help them achieve this. For many people their car is a lifeline. SPARC award holders are researching how older drivers use their cars, what helps them, and the implications of new technology.



## Promoting safe driving behaviour through technology: attitudes of older drivers

*Dr Charles Musselwhite, University of the West of England*

Being able to drive is growing in importance for an increasingly mobile older age group. Older drivers want to be able to keep driving safely for as long as is possible, and so are enthusiastic about the development of technologies which may enable them to do this.

Little is known about the actual travel needs of older people and the many different ways in which being able to drive affects their overall well-being. Therefore, focus groups and interviews with both older drivers and those who had recently given up driving were conducted in order to understand their needs, attitudes and preferences towards travel and driving.

The research found that older drivers needs can be split into three categories: practical (for example, getting to the shops and doctor's surgery); social (visiting friends and attending functions); and aesthetic (enjoying the countryside,

other towns, fulfilment of independence and control over one's life). Understanding social and aesthetic needs is crucial to a proper understanding of older drivers. This will inform how older drivers can be best supported, so that they can continue to drive safely, as well as enabling these needs to continue to be met when they give up driving.

Interestingly, the study found that female drivers are more likely than male drivers to make the decision to give up driving. This decision was made either as a result of self-diagnosis (because they felt they no longer had the ability) or due to a specific incident. Male drivers, on the other hand, are more likely to give up driving because they are told to do so. The realities of giving up driving were found to be different to those which were expected: in general, men were often devastated, whilst women were more philosophical.

This study showed that there is a difference between what older people expect of technological developments, and what designers actually provide. Older people want assistance, but at the same time remain in control of the tasks involved in driving a car; car designers seek to develop technologies which take away some of that control. Nevertheless, there is a range of technologies which designers and older people could work on together. This would enable designers to understand and take account of the social issues that may mediate or enhance the value of their designs. Certainly, potential technological advances resulting from this project could enable older people to continue driving for longer, whilst retaining confidence in their ability. This could ensure that older people continue to be safe drivers.

## Older people and transport: integrating transport planning tools with users' needs

*Dr Gregory Marsden, Leeds University; Dr Mima Cattan, Leeds Metropolitan University*

A lack of good transport options can be a significant barrier to social inclusion and independence. There is substantial evidence suggesting that older people suffer more than most from poor public transport and a badly maintained transport infrastructure because they are more dependent on public transport.

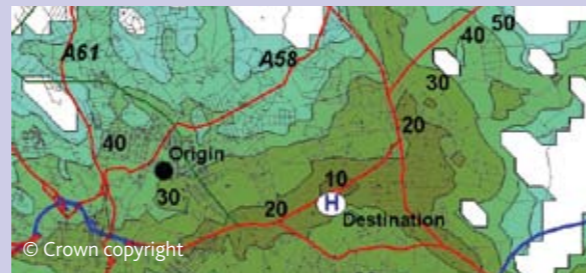
Maintaining independence and freedom by any means of transport (including on foot, by car or public transport) is particularly important to the health and mental well-being of older people. There is a need for major changes in the planning and delivery of transport infrastructure and services so that older people's views are taken into account. Older people want to continue using public transport, but their needs are often unrecognised.

This research brought together public health and transport engineering specialists with older people, to identify a range of actions which would lead to better services. Many of these actions are low-cost, easy to implement and would benefit other groups of people. Attention needs to be focused on improving the sensitivity of accessibility

planning methods, joining up transport services, and ensuring better dialogue with older people over planned changes and new designs.

It is difficult to capture the range of difficulties faced by older people through current planning methods due to the diversity in physical capabilities and comfort in getting around in different social settings. Mainstream transport planning does not recognise that the travel itself and the feeling of independence are often more important than the destination for older people. For instance, shopping is more than just buying food or clothes; it is an experience, a reason to go out and interact with others.

The study also found that there were a variety of problems which were faced by older people when walking round local neighbourhoods. These problems included: 'other uses' of the pavement; parking of cars; untrimmed hedges; hedge trimmings left on the path; and infrastructure issues, particularly in crossing roads. Many of the interventions vital to help older people would benefit all walkers.



Dr Gregory Marsden, the project director, said "street and transport design needs to be more inclusive by taking into account older people's needs, and therefore older people should be consulted during these processes. Transport providers should explore ways of providing an accessible and acceptable way for older people to make suggestions, comments and complaints about their services. The results from our research suggest that a community-led approach to transport planning is likely to be more revealing and successful than one

led simply by accessibility planning software tools."

## Advanced technology desires, needs and requirements of older drivers

*Mike Bradley, Middlesex University*

As the population in the UK ages, there are rapidly increasing numbers of older drivers. Driving helps older people to remain independent, yet little technology currently exists to give them the confidence to keep driving. The development of in-vehicle technologies to help driving has the potential to offer great benefits to older people. However, new vehicle technologies are targeted towards younger more technology-aware users.

Methods which involve the user in the design process are rarely used when designing cars and in-car technologies; when they are, older drivers are excluded. This study developed ways of engaging older drivers in the design process. This provided information about the real desires and needs of older drivers, which can be translated into specifications and requirements for designers.

This study developed an approach to designing in-car technologies which placed older people in the role of experts, supported by researchers and designers as facilitators. It identified issues which are of particular concern to older drivers, and investigated how technology might support drivers in these

tasks. By respecting the user as an expert, research and design effort was focussed on supporting driving activity, and avoiding enforced choices that might detract from driving skill.

Information from surveys and interviews conducted during this study revealed the central role which driving plays in the lives of many older people. Practical exercises showed that there was a very wide diversity in older people's driving attitudes and strategies, and in the way they approach new technologies. The context in which older drivers learned to drive, and the way in which they have developed their driving skills since, can highlight very different behaviours from those of younger groups.

Two key issues which older drivers were particularly concerned about were unintentional speeding and reverse parking. The development of enhanced in-car speedometer displays with visual information and warnings, potentially coupled with haptic feedback (related to touch) through the accelerator pedal, showed strong promise. This study also helped to explore how to present design concepts using static displays and a racing game, and to reveal attitudes to speeding.

Exploring the use of new technologies to aid reverse parking provided considerable evidence for the limitations and opportunities for these technologies for use by older drivers.





## Design and community regeneration: investigating personal safety concerns in socio-economically deprived communities in South Wales

*Professor Richard Neale, Glamorgan University*

Many older people have major concerns about crime and safety. This study developed a valuable approach for engaging older people in discussions about their communities, and priorities for action which could be incorporated into current methods for assessing the need for crime prevention measures.

The design of the physical environment can contribute to a decline in the social environment and careful redesign of the physical environment can therefore be used as a way to deter undesirable behaviour and reduce crime. Environmental improvements designed to create safer communities in deprived areas rarely consider how older people perceive and construct personal safety; this results in neglect of their needs and concerns.

This project was centred on some of the most socioeconomically deprived regions in South Wales, where there are particular concerns for the personal safety of older people, and investigated how this situation might be improved. The researchers identified particular areas and routes used by local people and the safety issues associated with them. Perceptions of safety cannot be reduced solely to features of the physical environment,

they are very much tied up with the social changes which characterise such areas.

Underlying the concerns of many older people was a decline in the sense of community, brought about by rapid social change. Many older people feel powerless in the face of these changes. Those surveyed had considerable concerns about crime, which at least over half had experienced, and about anti-social behaviour, which all had experienced.

Professor Richard Neale said "Our study highlighted the daily and on-going personal safety issues faced by older people in deprived areas. It also showed the realities of the decline of mining and heavy industry in communities in South Wales. Although these problems are symptomatic of nationwide social and cultural changes, they are magnified in these communities as a result of massive economic decline. Interestingly, the research findings showed that although older people have few concerns about the physical environment itself, the solutions which they suggested to improve personal safety included a number of situational crime prevention measures which involved the physical environment."

## Care systems

Getting back home is the greatest priority of many older people after a catastrophic fall. SPARC is supporting research to investigate ways of achieving best practice in the care of patients, reduce hospitalisation and restore independence as soon and as effectively as possible.



## Modelling health systems: delivering care to older patients with hip fracture

*Dr Christos Vasilakis, University of Westminster*

Improvements to health care systems can only be achieved once their extreme complexity is fully understood: this study provides a significant step forward in this process. The standards of care for older people with hip fracture vary greatly across the UK, but are often found to be unsatisfactory, and this is an area of care which would benefit considerably from reorganisation. Understanding the very complex systems which operate during the care of patients with hip fractures needs very detailed, precise analysis. This requires mapping the journey taken by the patient from initial admission to hospital through to discharge, including all the activities and processes involved in their care. This study has shown that it is possible to do this and to produce detailed maps of the patient journey, which can ultimately be incorporated into high powered computer tools. These support evaluation of alternative approaches to the organisation of the care of patients.

These mapping tools provide information which is used to develop simulation models. The models are represented by simple diagrams which are visually easy to interpret by people from a range of professional backgrounds. This increases the likelihood that different stakeholders will accept the findings and recommendations made by experimenting with the models. The knowledge gained from this study will help guide best practice in preparing an effective integrated care pathway. This could lead to improvements in patient outcomes, such as better survival rates, faster recovery, and an increase in those regaining their independence following a hip fracture.

# Activity and diet

The normal wear and tear which our bodies go through as we age can make older people more susceptible to problems with their joints and muscles. More than three million people are disabled by such problems, and a further five million suffer from arthritis, osteoporosis, rheumatic and similar diseases. Current advice is that older people should keep active as exercise and a healthy diet help to maintain muscle, bone and tissue.

SPARC projects cover a range of issues which link movement, activity, strength, diet and heart function, with the aim to improve understanding of what constitutes a healthy life style in later years. This work is important for developing more comprehensive advice, especially for those people who cannot follow conventional exercise regimes.

## Ageing, exercise and the heart

*Dr Matthew Lancaster, University of Leeds*

As we age, our ability to work and exercise at the same level as when we were younger, decreases. Ageing is also associated with an increase in the likelihood of developing cardiovascular problems. This age-dependent decline in the ability to exercise, and an increase in the likelihood of developing cardiovascular problems are two of the most important causes of ill health and death in the older population. Regular exercise helps the heart by improving vascular and cardiac function; but it is not currently known what effect exercise has on the ageing process in the heart.

Heart muscle changes at the cellular level as we age. Previous research shows that the ability of cells within the heart muscle to

contract and relax (which is important for cardiac function) is reduced in old age. This research investigated the effect of varying exercise routines on cardiac muscle.

Results indicate that taking part in regular exercise may reduce damaging effects of stress on the heart, which are more likely to occur during the ageing process. There were differences in the muscle cells found in the older and in the exercising group; this has implications for older people's health care and exercise routines. Therefore, responses to clinical treatments in older patients are likely to be different to younger individuals. Also results suggest that in order to ensure the most appropriate treatments, exercise history should be taken into account.

## The effects of temperature on muscular function

*Dr Richard Ferguson, Loughborough University*

Muscle function declines from the age of 50 onwards, with the biggest decline occurring from the age of 65. One of the main effects of this is a reduction in an individual's speed of movement which contributes to an overall decline in functional ability and mobility. This decline in mobility can have a major impact on quality of life and independence which could ultimately increase the need for residential care.

Muscles work by contracting and relaxing, and muscle efficiency is influenced by factors such as contraction speed and muscle temperature. Contraction speed

and muscle temperature reduce as we age. Understanding the impact of muscle temperature and contraction speed on mechanical efficiency is important in order to improve mobility and encourage exercise in older people.

The results from this research indicate that heating muscles before exercise increases mechanical efficiency in young people but decreases mechanical efficiency in older people. The reasons for this difference are unknown. It could be beneficial for the muscles to be kept 'cool' in order to maximise efficiency in older people. This may also help to explain why muscle

## Improving physical fitness and quality of life in older people

*Dr Gladys Onambélé-Pearson, Manchester Metropolitan University*



In an ageing society, the effects of age on muscle performance may be reduced if compliance to exercise is encouraged by giving simple advice on timing, duration, frequency, intensity, and if necessary, appropriate nutritional interventions. Research into the impact of nutritional supplementation in younger, more active, populations has been extensive, but little has been focused on healthy, older populations. This clearly identifies a gap in our knowledge. This project looked at the impact of healthy eating habits with or without nutritional supplementation, on exercise responsiveness. The results from this study suggest that the combined use of nutritional supplements and a structured exercise routine would give the most marked improvements on the health of older people. Further work is needed to investigate the role that exercise plays in this, and the level of exercise that gives the most favourable results.



temperature is lower in resting conditions in older people, in that there may be an evolutionary benefit for the muscle to ensure efficiency is optimal.



## Lipoprotein oxidation in ageing

*Dr Sarah Aldred, University of Birmingham*

There are many benefits of exercise in later life, but the direct benefits of exercise on the biological ageing process are not fully understood. An experiment involving two groups of older people was carried out to investigate the effects of exercise on oxidative stress in older adults. Oxidative stress is something which can happen if reactive "free radicals" outbalance good "anti-oxidants" in our bodies. It is often thought that oxidative stress becomes more common as we grow older.

Volunteers, aged between 65 and 75 were split into two groups. The members of one group exercised as normal without changing their usual routines, and the others followed a modest walking regime of three 30 minute walks a week for 8 weeks. The volunteers assigned to the exercise group, lost weight over the 8 week period whilst those in the control group did not. As weight loss is associated with health benefits such as reduced risk of heart disease, the results suggest that regular walking is beneficial to healthy older adults. The exercise carried

out in this study did not appear to increase oxidative stress. Some of the biological markers of oxidative stress which were measured were altered over the course of the study, but these changes were seen in both the control and the exercise groups. Oxidative stress in general is considered a risk factor for the development of diseases such as heart disease, arthritis, and some dementias. The results therefore suggest that exercise at this intensity and duration is not harmful to the health of older people.

Dr Sarah Aldred said "Our research deliberately focussed on the effects of low-intensity exercise as this can form part of an exercise programme which even quite frail people can take part in. The exercise did not appear to increase oxidative stress in participants and they also lost weight. The social and intergenerational benefits of walking are considerable, so we are really encouraged by the results which show that even low-intensity regular walking can be beneficial to older people's health."

## The effects of calorie restriction on ageing

*Dr Dianne Ford, Newcastle University*



The DNA within a cell contains all the instructions needed to make that living organism. Cells make use of the instructions encoded within DNA by first converting it into a molecule called RNA, then using that to make proteins,

which are the building blocks of life. This process of converting DNA to RNA is known as transcription. DNA methylation is a naturally occurring event that affects cell function by altering the expression of a gene (for example, by turning it on or off). It is essential because it helps cells maintain their regular functions. During DNA methylation, a methyl group attaches to a gene, preventing it from beginning the transcription process. In general, DNA methylation as a whole is known to reduce with ageing in a variety of tissues. However, specific genes may have either increased or reduced DNA methylation during ageing.

Calorie restriction (eating a diet complete in all regards but deficient in calories) is known to slow the biological ageing process, thereby helping you live longer. In humans, calorie restriction has been shown to lower cholesterol and blood pressure, but it is not currently known how and why this process works.

Sirt1 is an enzyme which has been shown to be increased during calorie restriction in other species. Sirtuins, such as Sirt1, are

known to interfere with the transcription of genes by preventing the initiation of transcription. It is thought that they might be involved in the lifespan-extending effects of calorie restriction in humans.

Changes in DNA methylation as we age could be having an effect on cellular function and therefore contributing to some of the problems associated with ageing. The aim of this study was to investigate whether increasing the amount of Sirt1 can alter DNA methylation.

The results showed that increased Sirt1 activity in human cells can lead to an increase in DNA methylation. This supports the idea that changes in DNA methylation brought about by Sirt1 may play a role in the beneficial effects of calorie restriction on lifespan. Over the longer term, this research might be used to contribute to dietary strategies or pharmacological interventions in order to mimic the effects of calorie restriction, potentially benefiting the general population.

# Vision

Our sight deteriorates with age. Reading becomes difficult and everyday tasks become more challenging. Poor vision is a major contributor to falls and accidents in the home, and deteriorating sight can lead to social isolation and extreme loneliness. SPARC projects are considering some of the fundamental changes which take place as the eye ages, the nature and behaviour of the cells, and how the eye and brain work together to process information. These will enable an understanding of how the individual navigates, for example, when walking in cluttered spaces and when driving in unusual environments.

## Age-related signalling capacities of the human lens

Dr Ian Michael Wormstone, University of East Anglia



Clouding of the lens, commonly known as cataract, renders millions blind throughout the world. Currently the only way to treat cataract is by surgery. A cataract operation involves removal of parts of the lens, and the tissue bulk known as lens fibres. By carrying out this procedure, the cloudy region is removed and a clear passage of light created. The remaining lens tissue is known as a capsular bag. Lens cells which survive the surgery remain in the capsular bag and grow on to all available surfaces which can result in light scatter and diminished visual quality (secondary visual loss). Following cataract surgery, wound

healing response leading to secondary visual loss is greater in the young than older people. To study the biological basis of these age-related differences a human lens capsular bag culture system was developed which allowed cellular growth rates to be assessed. Using this model, growth rate appears to be markedly faster in the younger group. The human capsular bag model provides a valuable human system to investigate the biological basis of ageing and in turn further our understanding of a common medical condition that affects both young and old.

## Mind Where You Walk! Older people's vision and stepping

Dr Mark Hollands, University of Birmingham

Around 30% of people aged over 65 living independently in the community fall each year. Most of these falls occur whilst walking on a level surface. Falls are a major cause of disability, and the leading cause of death amongst people aged over 75. Those who survive often suffer long-term problems such as: injury; infection; loss of confidence; poor mobility leading to social isolation and depression; increased dependency; and permanent disability.

Looking at where to place one's feet is important when walking, especially when changing a stepping pattern to avoid obstacles and walk safely. Recent studies have found an important link between the control of vision and eye movement and the control of stepping by the brain. The aim of this study was to determine if the risk of older people falling whilst walking is associated with a decline in the control of stepping by the brain (visuomotor processing), specifically when a change in stepping behaviour is required.

The research found that older people need more time to see where they are walking than young people in order to reduce their risk of falling. The results indicate that older people, and in particular older people at a higher risk from falling, need more time than younger people if they are to achieve similar levels of accuracy in the sideways component of their stepping. This difference is reflected in the finding from previous work in the laboratory which showed that older people at lower and higher risk of falling chose to look at a target for around 1.5 (lower risk) and 2 (higher risk) seconds before stepping on it. Younger people, however, choose to look at a target for an average of only 0.8 seconds, which is significantly less time than for either of the older groups. This suggests that older people require more time to plan and carry out visually-guided adjustments to their stepping. Although there were differences between the groups in the accuracy of foot placement, these differences were found



to be in the width of the step rather than length of the step. This is consistent with the findings of previous research demonstrating that older people vary their step width a lot more than their step length when walking. Furthermore, older people consistently made stepping errors to targets towards the edges of a walkway.

The risk of hip fracture in older people is 6 times greater during sideways than forward or backward falls, and 30 times greater if the fall results in direct impact to the hip region. The results from this study suggest that a reduced ability to control this type of sideways stepping movement may contribute to increased risk of falling in older people.

However, further research is required in order to fully understand the underlying mechanisms behind this.

Dr Mark Hollands said "when walking, older people need more time to view what is ahead of them than younger people. They respond differently to situations which arise and make more errors when stepping. This can mean they are at a greater risk of falling. The study has found that older people need more time to look at a target in order to plan and carry out stepping movements. This finding provides an important insight into why people become more prone to falls as they age."

## Age, eye movement and motion perception

Dr Tom Freeman, University of Cardiff

For many older people an active life style can become compromised by deteriorating eyesight. This deterioration includes the reduced ability of the eye and the brain to track and interpret movement whilst undertaking everyday tasks such as searching for objects, driving, and navigating a safe pathway along the street. This study compared how well both younger and older people track moving objects. Two types of tracking were investigated: involuntary tracking occurs

when an individual stares at a moving object, as a result of which the eye moves involuntarily; voluntary tracking occurs when an individual deliberately watches and follows a moving object.

The findings found that for some aspects differences due to age were not substantial. However when judging differences in the speed of two objects, older people tended to need greater differences to be able to make such judgements.



# Cognition and communication

For many people the cognitive system declines in later life, sometimes very rapidly. For some this decline, combined with deteriorating vision and hearing, can lead to significant communication problems. Many older people become very worried about occasional lapses in recalling names and faces and in comprehending what other people are saying. They take these as heralding the onset of cognitive decline although there may be explanations which are quite unrelated to cognition. Through SPARC, new scientific methods are being applied to study how the brain ages and how sensory and cognitive skills change with age. The SPARC projects are particularly concerned with understanding the range of cognitive performance in later life and the skills of listening, comprehending, recalling and speaking.



## On the tip of your tongue

*Professor Lorraine Tyler, University of Cambridge*

Difficulties with language are a source of concern for older adults, who worry that changes in their language abilities are a sign of dementia. These beliefs can undermine self-confidence, encouraging social isolation. Additionally, both older and younger adults believe that older adults have deficits in communication skills, leading to condescending communication styles which older adults find insulting and demoralising.

Difficulties with word retrieval, especially when trying to remember the name of a well-known face or object, is part of the normal ageing process and is not associated with general memory decline. The findings from this study help contradict the assumption that tip-of-the-tongue situations in old age reflect general memory deficits. Instead, the

difficulty appears to be localised, low-level and specifically to do with word production and the retrieval of the form of words rather than the higher-level meaning of those words.

A broad conclusion from this research is that not all cognitive abilities are equally affected by age. Understanding the neural effects of age requires understanding the effect of age on neural networks, not just individual regions. Finally, in order to understand fully the processes underpinning age-related changes in word production, this task must be placed in the context of other language abilities and other cognitive abilities.

## Measuring cognitive ageing in the human brain

*Professor Zoe Kourtzi, University of Birmingham*



A core challenge in human cognitive ageing is to understand the mechanisms that lead to rapid cognitive decline in some older adults while others maintain high levels of cognitive performance. This research aimed to identify markers of cognitive ageing by developing sensitive tools for the measurement and analysis of age-related changes in behaviour, brain structure and neural function.

The results of the research prove that these methods can be used to investigate perceptual decisions at the behavioural and neural level across the lifespan. This integration of advanced measurement and analysis methods will enable the development of new sensitive tools for studying the variability of cognitive ageing across individuals, from rapid decline to sustained high levels of performance.

## What makes synthetic speech difficult for older people to understand?

*Dr Maria Wolters, University of Edinburgh*

Computer-generated voices are used more and more frequently. They can be found not only in automated call centres, but also in satellite navigation systems and home appliances. However, computer-generated speech can be difficult to understand. Some simple changes to the voices could make an immense difference to the lives of many older people, enabling them to use these services successfully with much less frustration and anxiety. A study was carried out which investigated the effect of auditory ageing on the ability to understand messages concerned with appointments and medication that were spoken by two voices: a computer-generated voice and the human model for the computer-generated voice. Both older and younger people were studied. Older people had more problems than younger people when they had to remember complex, unfamiliar medication names spoken by the synthetic voice. From these results, a set of guidelines has been produced for adapting synthetic speech to older users with mild to moderate hearing loss:

- It is more important to speak clearly than to speak slowly. The frequency range that was particularly strongly associated with the ability to understand often contains short cues to the identity of speech sounds. These cues should not be shortened or distorted unnecessarily.
- Use phrasing to make information more noticeable and obvious. In some particularly difficult medication names, the initial and final sounds were too short or distorted during the synthetic speech, because of problematic transitions between these sounds and the surrounding material. Placing pauses between such difficult information and the surrounding words not only eliminates these troublesome transitions, but also highlights that the information contained in the phrase is important.
- Use familiar words and phrases. The only times when clear differences in understanding emerged between natural and synthetic speech was when complex, unfamiliar words were used.

It is good design practice to avoid this type of language when designing system prompts.

These guidelines represent recommendations for best practice that will benefit a large number of users ranging from those who have no problems, to users with moderate hearing loss. Future work will validate and test these guidelines.



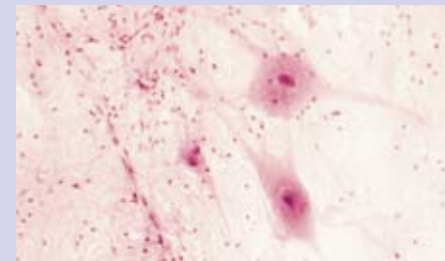
# Chemical biology of ageing

Organisms age through a progressive and irreversible decline in the functional capacity of their tissues and organs. However, the exact mechanisms by which this occurs varies from species to species and from tissue to tissue. SPARC award holders are working to understand how these mechanisms operate and are designing treatments to deal with them.

The projects have strong links with other SPARC work on vision, activity, movement and ageing mechanisms.

## What makes our cells age?

*Dr Terry Davis, Cardiff University; Dr Mark Bagley, Cardiff University*



Valuable progress is being made in understanding how our cells age in the body. Replicative senescence is the limited ability of normal human cells to replicate. There is some evidence to suggest that replicative senescence may contribute to normal ageing in the human body. Normal human cells are capable of only a limited number of replications, suggesting a link between replicative senescence and tissue degeneration. In addition, some tissues require continuous cell turnover during life, so senescence can limit tissue maintenance. Little is known about the process of replicative senescence. A better understanding may enable us to prevent some of the age-related deterioration of tissues.

Two SPARC projects have investigated different aspects of replicative senescence by studying cells from individuals with Werner's Syndrome (WS), which is a rare genetic disease where people age rapidly and prematurely. Fibroblast cells (a common cell found in the body) from people with WS replicate fewer times than those from people without WS and resemble cells that have already undergone a premature ageing process. This early senescence may be responsible for features of the premature ageing process seen in WS individuals. Many cell processes are controlled by signalling pathways which

act as a communication system within the cell. It is thought that the accelerated replicative senescence in WS is caused by increased stress signals inside the cells. A molecule known as p38 is a component of one of these signalling pathways.

The work by Mark Bagley focussed on the development of methods to examine the effect of a range of chemical inhibitors of accelerated ageing, on the growth rate of WS cells.

The work was successful in providing chemical inhibitors of accelerated ageing for investigating some of the fundamental mechanisms involved in ageing. It is anticipated that further work to investigate the action of these inhibitors on growth rate and cell morphology, will reveal the underlying mechanisms which link a failure to replicate with premature senescence and the onset of accelerated ageing.

Terry Davis' work has concentrated on understating how one particular inhibitor of accelerated ageing, which inhibits p38, works. The findings of this study strongly support the idea that p38 activity may contribute to accelerated ageing in cells from individuals with WS, and therefore rapid ageing in individuals with the syndrome. The importance of this observation is that there may also be several situations, for example stress and infection, where activation of p38 could also lead to accelerated ageing in human cells without WS. Although inhibiting p38 could have possible therapeutic effects in individuals with WS, further investigation is required. This is because inhibiting p38 could be dangerous if it is not targeted to the specific cells it is intended to reach.



## Can the fruit fly help us understand how we age?

*Dr Elizabeth Ostler, University of Brighton*

Studying ageing in humans is difficult because it is a slow and gradual process that continues throughout life. Fortunately, because ageing is so common in nature we are able to study much simpler animals to understand this process. Fruit flies have very short life-spans which can be controlled and varied in the laboratory making them useful for studying ageing. In addition, some of the processes thought to be involved in ageing are common to both humans and fruit flies.

Advanced Glycation Endproducts (AGEs) are formed when sugars found in the body react with proteins in the body's tissues. Proteins that have been affected by AGEs may lose their shape and flexibility, which is thought to prevent them from working properly, and may be the cause of some of the problems associated with ageing. These affected proteins have been detected in the tissues of healthy people as they get older and have been found at higher levels in patients with diabetes. It is not yet known whether AGEs cause frailty or whether they are just a symptom of living a long time.

This study investigated whether AGEs are involved in the ageing of fruit flies and the results suggest that they do accumulate as fruit flies age. This process varies slightly under different environmental conditions and markedly between male and female flies. Further work is currently being conducted on an extensive data set to measure the size and nature of these differences more accurately.

# Ageing mechanisms and oxidative stress

The ageing process is something which humans share with the vast majority of other species on the planet. Ageing evolved at least a billion years ago and has been part of the genetic inheritance of species ever since. Studying the basic mechanisms of ageing in proteins, cells, tissues and animals, allows us to understand how they operate. The actions of oxygen radicals and reactive oxygen molecules are thought to play a key role in the ageing processes of many species. This basic information will enable further research to take place, aimed at preventing the degenerative effects of these processes.

## Unnatural ageing of killer cells

*Dr Donald Palmer, Royal Veterinary College*



The human immune system declines with age, which leads to a higher incidence of infection, tumours and autoimmune diseases. Natural killer (NK) cells are a type of white blood cell, which provide a crucial first line of defence during innate (inherent) immunity. They are important due to their ability to eliminate pathogen-infected cells and tumours, while also co-ordinating initiation of the adaptive (learned) immune response. Individuals who lack NK cells suffer from increased

and recurring viral infections and are susceptible to certain tumours. These are clinical symptoms which are often associated with increasing age.

The main aim of this research was to test the hypothesis that the changes in the immune system which occur as we age could be due, in part, to an age-dependent impairment in NK activity. The results from this research suggest that NK cells' activity is reduced with age. Further research will investigate this in more detail.



## Oxidative stress and genetic variation in healthy human ageing

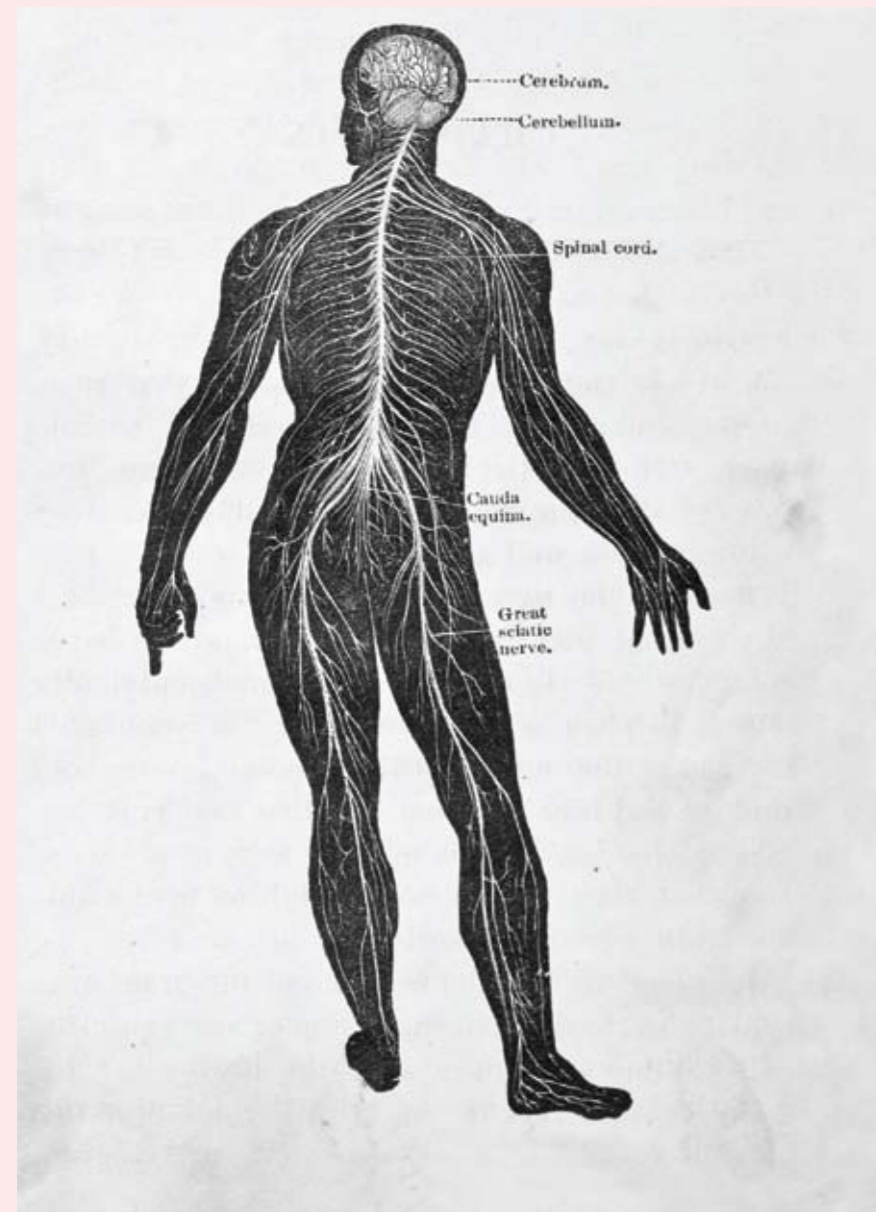
*Professor Paul Winyard, Exeter University*

Family studies of ageing have shown that genes are important in determining who ages well and who does not. However, a current limitation of these genetic studies is that associations between healthy ageing and particular gene variants cannot easily be backed up by direct evidence of biochemical changes in ageing pathways. This is largely due to a lack of analytical methods that are suitable for the rapid screening of large numbers of samples. This project went some of the way to establishing experiments which are suitable for the analysis of thousands of human blood samples in order to assess the effects of gene variants on oxidative damage. This may eventually provide the necessary tools for major advances in understanding the role of oxidative stress in human ageing. Oxidative stress is something which can happen if reactive radicals outbalance good anti-oxidants in our bodies.

Studying the basic mechanisms of ageing in proteins, cells, tissues and animals, allows us to understand how they operate. This information will enable further research to take place, aimed at preventing the degenerative effects of these processes.

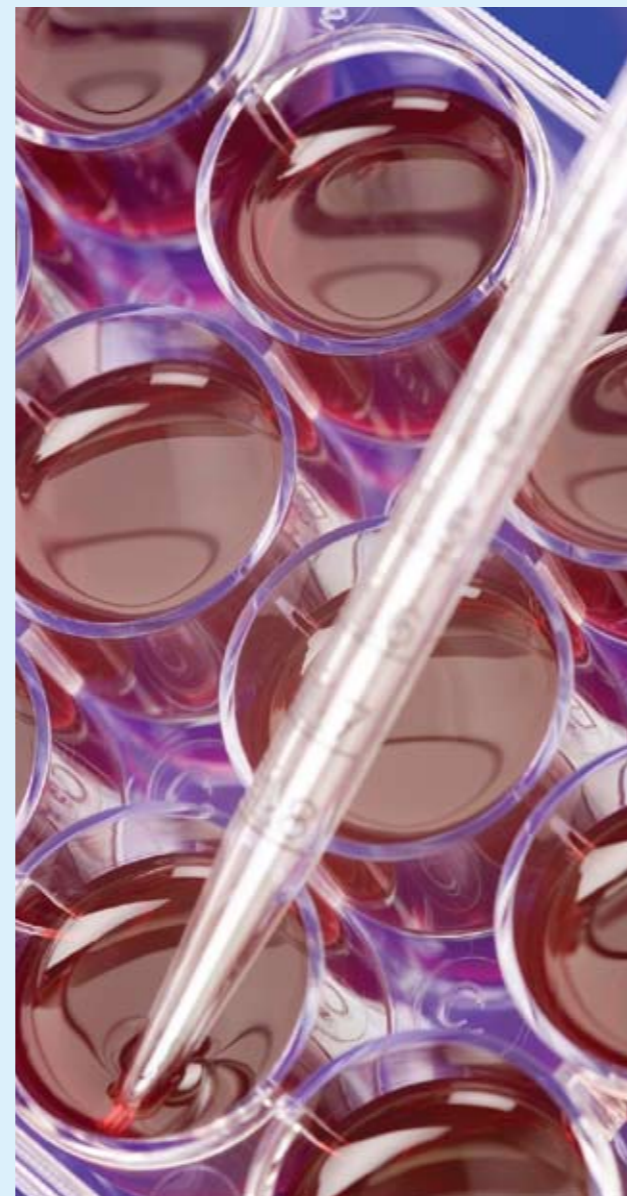
## Understanding age-related changes in neuronal function

Dr Katrin Jennert-Burston, University of Brighton



Increasing age is associated with changes in the nervous system. It is clear that ageing alters both gene and protein expression but the causes of these changes are unknown. The nervous system of the pond snail (*Lymnaea stagnalis*) provides an ideal model system to start to study this because it allows analyses of ageing in single identified neurons (nerve cells) and small networks. Previous work has shown that age-related changes in invertebrate neurons are extremely similar to those seen in higher organisms. This project used *Lymnaea* to relate age-associated changes in behaviour,

to alterations in the protein expression in individual neurons. This research has identified proteins in the Central Nervous System (CNS) which change during the ageing process. The results also suggest that many of the changes that occur with increasing age in the snail's CNS, occur across the whole CNS and are not restricted to any particular region. In the future, this work could potentially lead to the discovery of new drug targets for the treatment of cognitive and motor disorders in the elderly.



## Understanding stem cell ageing

Dr Ilaria Bellantuono, University of Sheffield

Ageing is a series of subtle changes in the cells and tissues of our bodies which make us increasingly frail and increase our risks of developing diseases. This frailty is a major problem which old people face today and which can prevent them from living independently. Understanding the way in which our bodies age, will enable us to develop new ways of tackling some of the diseases associated with ageing such as Alzheimer's Disease, Rheumatoid Arthritis and problems with the immune system.

Stem cells play an important part in the body's ability to renew and repair itself. Most normal cells are committed to being of a certain type with a set lifespan. Stem cells, though, can both renew themselves as well as create new cells of what ever tissue they belong to. These stem cells are therefore essential for the development and maintenance of all tissues in the body because they are able to grow and transform into many different cell types. In adults, stem cells are important in the general maintenance of healthy tissues and organs, as they are responsible for providing new, healthy cells to replace older ones.

The ability of stem cells to grow and transform into different cell types decreases with age. This can mean that tissues and organs within the body are

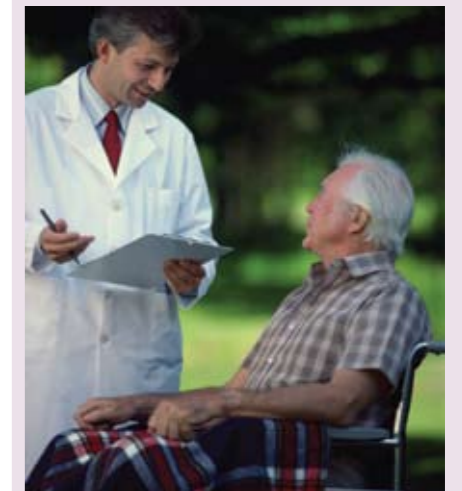
not able to stay as healthy, which can affect function and the development of diseases associated with ageing. The biological processes which are associated with this stem cell ageing are unknown. Understanding the genes within our DNA which are responsible for, and the processes which lead to, stem cell ageing should help in our understanding of ways in which we can extend tissue survival and repair.

Understanding stem cell ageing could have a huge impact for older people in the future. This could uncover ways of extending tissue survival and repair, thus preventing or alleviating some of the diseases associated with ageing.

The results from this study suggest that gene expression in haemopoietic stem cells changes during the ageing process. This means that the stem cells in older people may not be able to function as well as in younger people. For example, haemopoietic stem cells are responsible for producing the cells which make up the blood; with age they produce a fewer number of cells which are capable of fighting infections. Interestingly, new evidence suggests that accelerated haemopoietic stem cell ageing might be involved in the development of autoimmune diseases such as rheumatoid arthritis.

## Oxidative stress and ageing

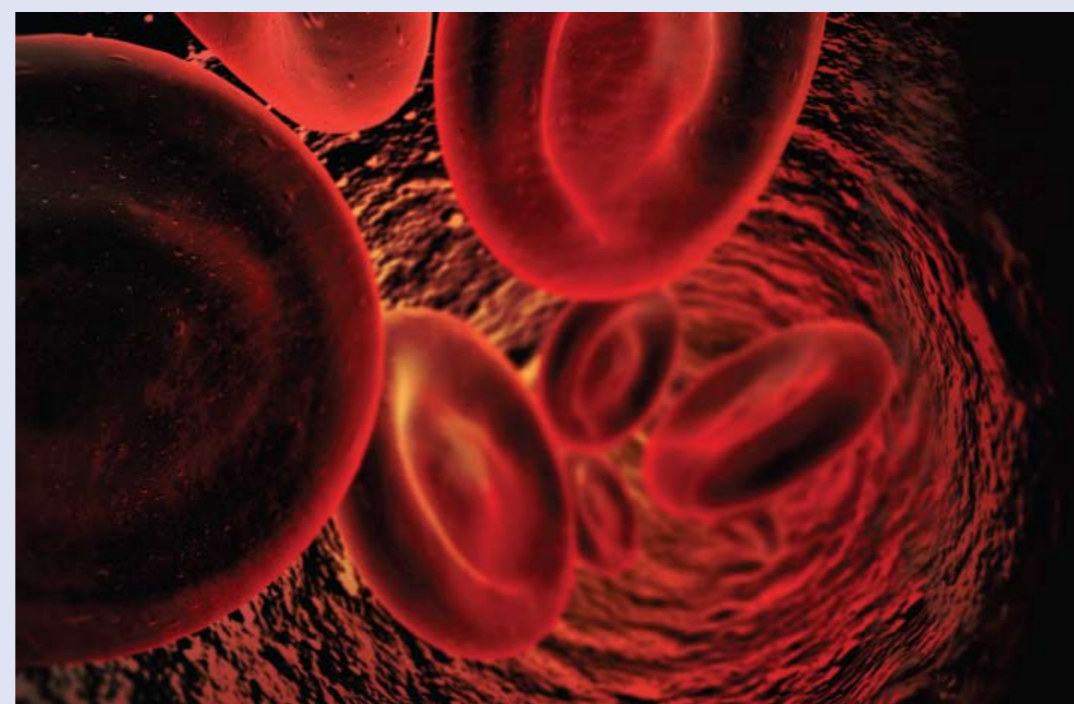
Dr Richard Hartley, University of Glasgow



Radicals, such as reactive oxygen species (ROS), are highly reactive molecules which are naturally occurring by-products of normal processes within the body. When antioxidant levels are not high enough, or during some diseases, the amount of ROS can increase and may react with DNA, lipids and proteins to cause damage. Oxidative stress due to ROS is a major contributor to the process of ageing and to many diseases including neurodegenerative diseases (such as Parkinson's Disease and Alzheimer's Disease) and stroke.

It is very important to be able to detect and distinguish between the various chemical contributors of oxidative stress in order to understand it properly. The aim of this project was to advance understanding into how oxidative stress and ageing are linked by the development of new methods to study this process. In the future, this information may enable a healthy old age to be achieved through appropriate diets, lifestyle and medicines to alleviate the effects of damage through oxidative stress. The methods developed in this study will provide an important opportunity for other researchers to further understand the processes associated with oxidative stress and its impact on ageing.

Understanding the biological sources of radicals, their behaviour in different environments and tissues, and the cellular responses to them will be key to understanding the process of ageing itself. Since oxidative stress is associated with the development of neurodegenerative diseases such as Parkinson's and Alzheimer's Disease, understanding how oxidative stress and ageing are linked may help us achieve a healthier old age.



## Ageing and cardiac function

Dr Andrew Trafford, University of Manchester

Cardiovascular diseases are the single largest cause of mortality in Western societies. Of these, diseases of the heart and blood vessels are the most common. Ageing is a major risk factor for the development of heart failure and for atrial fibrillation. This research showed that the myocardium (the muscular wall of the heart) appears to become stiffer with age, with an increase in the amount of collagen in the aged myocardium. Interestingly these changes in collagen which happens during the ageing process are directly comparable to those seen in heart failure.

# Life in the home

Older people can enjoy the independence that comes from living in their own homes only if their environment matches their needs, capacities and limitations. SPARC research is investigating how people use their homes as they move through life, from the domestic routines of raising a family through to caring for themselves or a partner. It is assisting those whose homes have to be altered to make key decisions, so that the changes are beneficial and do not destroy the essential nature and meaning of their homes. Making homes safer and more secure is being investigated through developing the potential contribution of new and innovatory electronic technologies.



## Technology to support ageing in place

*Dr Shaun Lawson, University of Lincoln*

The majority of older people want to maintain an independent lifestyle and remain in their own homes. Evidence suggests that older people who remain independent are healthier and enjoy a higher quality of life than those reliant on residential care. However, unsupported independence may lead to vulnerability, and this can also put increased demands on carers. New research has looked at how current technologies can be used to support older people in their daily lives.

Assistive technologies which provide reminders to help in decision making, particularly in a just-in-time fashion, have significant potential to help older people and those who care for them. However the requirements of these technologies are not well understood and demonstration systems often rely on complex equipment which is difficult to imagine installed in a normal home setting.

The study investigated the reminder systems currently used by a small group of older people; their attitudes to technology; and, through some simple experiments, their reaction to certain reminders presented using a variety of simple technologies and formats. The research revealed that older people currently use a range of different personal reminder strategies. These often include relying on family members who may give phone call reminders, keeping diaries, calendars and notes, and memory joggers. Generally, the participants in the study disliked impersonal services, such as those provided by call-centres, and preferred the interaction which accompanies a telephone conversation.

Dr Shaun Lawson from the University of Lincoln said "various technology-based reminder systems were trialled in our study with some success, although the

effectiveness of a particular system was to some extent dependent on the activity taking place at the time. For example, spoken reminders worked well when someone was undertaking a quiet task such as reading, but less so when watching TV, for which, repeated on-screen messages worked best. Overall, it appears that to be effective, messages and messaging systems have to be tailored to the particular behaviours and routines of the individual."



## When designers meet older people

*Professor Paul Chamberlain, Sheffield Hallam University*

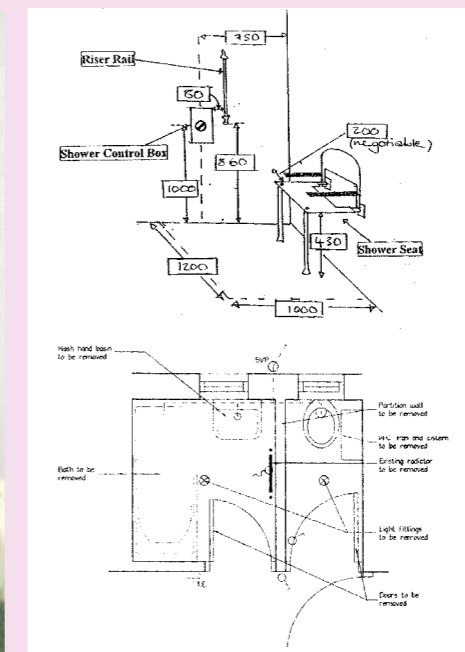
Often designers pay little attention to the needs of older people yet older people have a major part to play in the design of everyday products and environments. Designers usually design for some average range of abilities and ignore the needs of those with limited function or capability. Working with three groups of older people and a group of carers, the research team developed a methodology for generating and discussing design concepts with older people. As a result, a range of designs based on the needs and aspirations of the participants were developed, and in the process a number of insights about designing for older people were gained. The experience was challenging and revealing, and underlined the need for much closer engagement between designers and older people.



## Communication when designing housing adaptations

*Phil Astley, London South Bank University*

The key to successful housing adaptation is the resident's ability to visualise what the completed work will look like. Many older people are concerned that a proposed adaptation will unfavourably change what they regard as their home, and so do not agree to adaptations being made. Visualising the appearance of the home after an adaptation is very difficult. In this research, six domestic adaptation projects were investigated. Properties were inspected, and interviews were carried out with residents and, in some cases, with their carers. Interviews were also carried out with a range of professionals. The ability to visualise what the finished adaptation would look like was found to be greatly influenced by the way in which the reasoning for the adaption was presented and communicated by the occupational therapist involved. This had a direct impact on the satisfaction that the residents had with the end result, as did the aesthetic appearance of the completed work.



# Product Design

Surprisingly little is known about the range of abilities within the population to undertake routine domestic tasks. As a result, many consumer products are designed with the average person in mind leading to the exclusion of many older people. Designers require much better information about the abilities of people of all ages if they are to design better products. SPARC researchers are developing new approaches to gathering design data which can be used by designers of packaging.

## Designing for inclusion

Dr Avril Thomson, University of Strathclyde



Many older people struggle when trying to open packaging, but there is little interest amongst designers in meeting older people's needs, or producing designs which would enable a larger proportion of the population to open packaging more easily. This study set out to understand the extent to which designers would use more detailed information about the capabilities of older people as users during the design process. This was done through a number of trials with older people, observing and recording how they opened packaging, and through a series of interviews with designers about how they approached the design of packaging and the potential of using biomechanical information. The research highlighted the fact that jars and bottles were the most difficult to open of a range of packaging, sometimes resulting in pain and discomfort, even for some younger participants. Participants used various 'opening' methods, illustrating both the challenges for users as well as for designers of packaging.

Interestingly openability, a big issue for many people, was not found to be a major issue for designers or their clients. They thought that if it was taken into account it could have an adverse impact on other important design considerations. In addition they felt that poor openability would be something which would be noticed during field trials and corrected then. However, designers rarely consulted older people about their designs, few had any experience of designing for inclusion, and even fewer any experience of using ergonomic data.

Data derived from biomechanical tests, and observations of users of packaging, was viewed with suspicion by the designers. They did not feel it reflected real-life and felt it was too situation and product specific, and too precise to be of value to them. However, it was thought that video footage alongside biomechanical data would be valuable. Nevertheless, socio-economic information was considered more valuable.

This research highlights the need for designers and their clients to understand better the value of Inclusive Design to society, and the role that ergonomic and biomechanical data can play in avoiding exclusion through design.

## Making jam jars easier to open

Dr Alaster Yoxall, Sheffield Hallam University

For many older people, independent living can be compromised by difficulties in opening food packaging. The jam jar is often a source of difficulty, but it doesn't need to be. Using a new device for gathering data, the abilities of over 1000 people to open jars were measured. Despite variations relating to age and gender, it was possible to identify a simple design standard which would enable 97% of the population to open all jars between 55mm and 85mm in diameter without needing to resort to kitchen aids.

Hands are used for many things, from the tiniest and most dexterous of tasks to heavy manual labour. Nearly all actions using the hand require some form of grip, but as people age there is a massive decline in strength and dexterity. These natural decreases, combined with debilitating illnesses such as arthritis,

mean that hand grip strength and finger grip strength can be seriously affected in older people. This makes it much harder to twist, pinch and pull objects. There is often a marked decrease in torque (turning and twisting) strength which occurs with age, and this is caused not so much by a decrease in wrist strength, but by a decrease in grip strength.

The strength and forces that people are able to apply to a task are dependent on many factors and can be influenced by age and physical condition. As age increases past 60, strength begins to reduce rapidly. The force that can be applied to packaging is also very dependent on the nature of the packaging itself. Even seemingly small changes in materials or shape can have a large impact on the forces an individual is able to generate. Specific testing is therefore required to determine the forces that a consumer will be able to apply to a particular package.

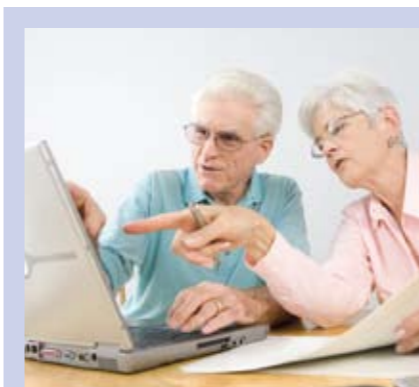
When the strength of the weakest individual within a target group has been established,

design limits based on the strength of that weakest user can be set. If these design limits are then adhered to, all individuals within the target group should be able to open the packaging. In the case of food packaging such as jars, the target group should encompass as much of the population as possible and be designed with the weakest consumers in mind.

The current opening torque strength requirements for jars mean that many users are unable to open them. This is especially the case for opening larger jars, where tools are frequently required to aid this activity. This is unacceptable. Judging from the test data, a reasonable design standard would be to set a limit of 1Nm torque to open a medium size jar. For the larger sizes of jar, this may challenge manufacturing processes. However, this could be overcome by either packing foods in smaller quantities or through creating new designs of jar of the same volume but with smaller closures.

# Interface Design

Many older people use computers to access the internet. Many more would like to do so, but have difficulty navigating the information provided on a screen. Understanding how older people use computers, structure information and browse the internet is essential to developing better interfaces. This is a principal aim of the SPARC projects. So too is the development of practical recommendations for systems designers.



## Age Related Differences in Web Browsing

Dr Panayiotis Zaphiris, City University

Older people browse the internet in a different way to younger people, creating significant challenges for those who wish to design web sites which appeal and can be used effectively by people of all ages. Interestingly older people read on-screen information as quickly as younger people, but they move the mouse more slowly and when progressing through a hierarchy of screens follow a different decision making process. For ease of use, speed and retaining a sense of position on the web, sites designed with shallow hierarchies may be more easily handled by older people. These significant age-related differences have important implications for web design.



## Improving computer interaction for older users

Dr Faustina Hwang, University of Reading

Computers are used by people of all ages. For some people, though, difficulties with mouse and cursor control can make it difficult to use a computer easily and effectively. This study has looked at whether techniques which have been developed to help with "point and click" activities improve mouse and cursor control in both older and younger people. The research found that targets which expanded to a larger size, giving the user a bigger area to click on, meant that users were able to complete tasks faster and made fewer mistakes. Compared with static targets, which are typical of a "regular" computer screen, expanding targets gave a 13% improvement in the time taken to select, and reduced the number of mistakes made by half, for both older and younger users. Previous studies of techniques which aid target selection have shown the benefits for younger users, but they have not fully investigated the performance of older people using these techniques.

Dr Faustina Hwang from the University of Reading said "our findings show that expanding targets may help to make computers easier for older people to use. Compared with younger users, older people experience greater difficulties positioning the cursor on the

computer screen, take longer making selections and homing-in on a target, and make more mistakes when selecting targets. These difficulties can present a significant limitation to using a computer easily and effectively. Target selection is such an important and frequent task, so any improvements that we can make will have a big impact on overall computer use.

Computers are an excellent way of tackling social isolation, which can become a problem as we get older. We hope that by making the basic tasks involved in computer use quicker and easier, more people will be able to take advantage of the benefits that computers can offer; for example, keeping in touch with family and friends, accessing information about healthcare and community services, or booking air and train tickets."

This research concentrated at looking at one expanding target at a time, and so further investigations will need to look at how target expansion will work in more realistic situations where there are multiple targets on the computer screen. In the future, this could benefit not only personal computers, but also other technology such as wall-sized displays, touch-screens on mobile devices, or assistive robots.

# The Older Worker

Few workplaces or organisations have been designed with the needs of the older worker in mind. Despite the contribution of older workers, few employers and policy makers place enough value on their knowledge and commitment to work, to implement changes to enable them to stay at work. These changes would, in general, be inexpensive and would benefit all workers.

In the past, workplace design has been neglected by employers, policy makers and researchers. SPARC award holders have been pioneering research on the older worker, by developing a commentary on the state of knowledge in the area and exploring improvements to jobs and workplaces.

## Understanding the older worker in construction

Professor Alistair Gibb, Loughborough University



Work in the construction industry is physically demanding and stressful, often for long hours in hazardous conditions. This study investigated the needs and abilities of older workers in the construction industry and has provided an insight into how the working environment may be improved to accommodate those needs.

Interviews with workers in the construction industry identified the impact of working conditions on their health and career paths. Poor working conditions, coupled with widespread self-employment, has created an environment where when major physical injuries are suffered by the individual, the consequent financial burden

may be largely met by the taxpayer rather than by industry.

One of the most important issues affecting older workers was employment tenure: being directly employed rather than self-employed is associated with a more favourable working environment. The research suggested that by easing the physical burden of the work wherever possible and by developing interventions to encourage all workers to follow safe practice, work-related injury and ill-health could be largely prevented in the long-term, allowing older workers to remain in the industry for longer.

Professor Alistair Gibb, the project director said "This research has shown us that older workers want to remain in the construction industry, but although their skills and experience are valued by employers, there is often a trade-off between that and their physical fitness. In such a competitive industry where workers are generally paid based on what they do rather than hourly, many older workers leave as they can't keep up. Where cheap labour is readily available, there seems to be very little incentive for firms to bear the costs of making the workplace less hostile for the older worker. In order to make a more favourable, safe environment for older workers in the construction industry, intervention is required both at the industry level, and locally by employers."

## Improving the working environment for older workers

Professor Peter Buckle, Surrey University



A qualitative study of older workers has identified important themes and generated a new model of factors important to the ageing workforce. The research found that older workers motivation to continue to work could be greatly improved if more attention was paid to both the way they are managed and their physical working environments.

The research indicated that older workers often become reliant on younger workers to undertake more physically demanding tasks. This has led to a culture where younger workers believe they 'carry' older workers who earn more than they do, and older workers believe that younger workers are unreliable and less skilled. With increasing numbers of older workers, this may be an important issue for work-planning and allocation, especially as there is the potential for serious intergenerational conflicts in the workplace.

To some extent these problems can be overcome by better equipment, designed to reduce the physical demands for those who undertake heavy manual tasks, and enhanced workplace design could support those in office based roles.

This would enable older workers to undertake a fuller range of tasks and help to ensure that younger workers are not subject to the work-induced health-related disorders which have affected today's older workers. New approaches to the allocation of work, especially the scheduling of shift work would benefit all workers, not just older workers.

Professor Peter Buckle, the project director said "Our research has enabled us to create a new model which identifies factors important to the ageing workforce. By mapping existing practices to the new model, and by identifying and resolving areas of difference, organisations and managers will be able to better maintain and motivate their older workforce."

# Going places with SPARC

SPARC is a short-term initiative designed to stimulate long-term interest in ageing research and its application. It is funded by the Engineering and Physical Sciences Research Council (EPSRC) and the Biotechnology and Biological Sciences Research Council (BBSRC) and supported by valuable contributions in kind by universities, professional bodies, voluntary agencies and industry. The 34 pump-priming research projects reviewed in this document were selected after a highly competitive review process of nearly 200 proposals. Although largely pilot studies their findings have been presented at both national and international conferences and seminars, and at SPARC workshops. Most of the SPARC workshops, have showcased the best of British ageing research to audiences of professionals, practitioners and policy makers from a wide variety of backgrounds as well as older people and scientists; others have been principally for audiences of scientists. Nearly all the presentations made at these workshops can be found on the SPARC website [www.sparc.ac.uk](http://www.sparc.ac.uk) along with Executive Summaries of many of the projects, audio interviews with award holders and lots of other useful information.

"Ageing research thrives on the enthusiasm, support and commitment generated when the leading-edge of science is informed by the sharp-end of practice and tempered by the realities of growing older. For four years SPARC has been repositioning ageing research to ensure that researchers, professionals and older people value and support each other in the quest for better quality of later life in all its guises." Professor Peter Lansley, *Director, SPARC*



## What Next?

A new programme funded by EPSRC is planned for 2009 in order to carry on SPARC's pioneering approach of encouraging research findings into practice. This will add even more stakeholder engagement activities to a continuing programme of workshops and publications.

## Funding Bodies



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