Internet Use and Time Use

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The importance of multitasking

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ABSTRACT. Scholars are beginning to question the impacts of the Internet for the conceptualization of time and time use. However, discussion in terms of the impacts of the Internet for multitasking has been absent from this debate. Multitasking has, until recently, been a forgotten dimension of time-use research. The phenomenon has long been recognized as important, yet it is only in the past decade that time-use researchers have begun seriously both to record and analyse related data. Such studies have shown that a more fully informed understanding of the true extent of time use and activity participation can emerge through the consideration of multitasking. This, in turn, can present a more accurate picture upon which measures of change in time use can be assessed. This article is concerned with an exploratory discussion of the impact of the inclusion of multitasking data upon perception of change in time use as a result of Internet use. Following theoretical discussion, the article presents evidence from a longitudinal, diary-based panel study with around 100 participants and a questionnaire survey with 1000 participants. The article explores the prevalence of multitasking and reveals clear implications of Internet use for the same. In conclusion, those seeking to understand the influence of Internet use upon time use must include multitasking in their analysis if they are to avoid an incomplete and potentially misleading account of time use (and change therein) in the information age. KEY WORDS diary study; Internet; multitasking; time use

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Introduction

There are few published studies in the time-use literature that consider the double counting of time through multitasking. Termed variously simultaneous activities, overlapping activities, concurrent activities, parallel activities, secondary activities, multitasking and polychronic time use (Ironmonger, 2003), the phenomenon has long been recognized as important in time-use research (for example, Szalai, 1972). However, it is only in the past decade that researchers have begun seriously to record and analyse such data. Theoretical conceptualizations of time, assessments of the economic, political and social impacts of clock time and analyses of space-time interactions (and considerations of the effects of the Internet on this) have similarly tended to neglect the double counting of time through multitasking (on the conceptualization of time, a notable exception is Gershuny and Sullivan, 1998). However, accounting for multitasking may provide a more fully informed understanding of the true nature of time, allowing us to examine 'the composite human *experience* of time' (Gershuny and Sullivan, 1998: 84, emphasis added). Considering time *use*, accounting for multitasking may give a fuller picture of the reality of everyday behaviour, presenting a more accurate picture upon which measures of change, in reaction to external stimuli, may be assessed. Conversely, failure to account for multitasking may lead to an incomplete and potentially misleading understanding of time use and change in the same.

This article uses time diary and questionnaire data to examine the importance of multitasking for our understanding of time use and the impacts of Internet use on it. The article eschews discussion of the impacts of Internet use for society more broadly, highlighting, rather, *the importance of multitasking for the understanding of the impacts of Internet use*. The article is exploratory, discussing multitasking as an emerging issue in the field of time use in the information age. In so doing, the article considers the following:

- How *prevalent* is multitasking? Multitasking is only likely to be important to the understanding of the impacts of Internet use if it occurs frequently in the individual's day and is commonplace throughout society. New empirical data is presented, to contribute to the existing literature regarding the prevalence of multitasking in modern society in the United Kingdom (UK). The article continues to contrast the prevalence of multitasking whilst offline and online, highlighting the role of the Internet in changing multitasking behaviour.
- Does multitasking affect our *understanding of time use* – of the time that we spend participating in different activities? If multitasking substantially alters the individual's activity profile, conclusions drawn in wider time-use research (for example, theories of time accounting; historical perceptions of society, from the explanation of how our ancestors lived to the understanding of how

and why countries/societies develop economically, politically and socially; the rise of social inequality, at the micro and macro levels; the impacts of Internet use) and resultant time-use policies may be flawed (for full discussion of the varying uses of time-use data and theories of time accounting, see Gershuny, 2000).

- How does multitasking affect our understanding of *change* in time use, in response to external stimuli? Much time-use research, based on analysis of primary activities only, considers change in activity participation as a zero sum equation; that the addition of one activity necessitates the substitution of another (Robinson and Godbey, 1997). Of particular focus in this article is change in time use in response to Internet use. Following sections discuss in full the reasons to suspect that Internet use will facilitate greater multitasking, and data are analysed to uncover the relationship between Internet use and multitasking.
- Finally, it may be that multitasking is prevalent, but this does not necessarily mean that these activities are *important* to the individual, society or time use as a field of study. Thus, the article discusses the nature of multitasked activities, considering which activities are amenable to multitasking and why. Within this, the article considers the social impacts of an increase in Internet-enabled multitasking.

Developing through seven further sections, the article first defines multitasking. A brief review of the literature on multitasking follows, which identifies a lack of clear knowledge about patterns of multitasking. There is a corresponding absence of empirical and theoretical discussion of the impact of Internet use for multitasking, reflecting the early stage of time-use research in both fields. In the following section, the theoretical basis for the suggestion that Internet use may influence the prevalence of multitasking is developed. The empirical studies are then considered, with a presentation of the methodology and sample composition for the two studies. The diary study results and questionnaire data are analysed to explore the extent to which multitasking exists and how Internet use interacts with this, with a focus upon the impact of the Internet on the ability and propensity to multitask. The article concludes with an assessment of the implications of the findings for our understanding of time use in the information society, highlighting areas of further research to progress the exploratory analysis presented in the following sections.

Defining Multitasking

The following definition of multitasking has been developed by the author for use in this research:

> Multitasking is the simultaneous conduct of two or more activities, during a given time period.

There is some debate regarding the extent to which individuals can *truly* multitask (Hungerford, 2001; Ironmonger, 2003). However, there can be little doubt that, *considering the time episodes used in the majority of surveys*, individuals can and do combine activities, both actively and passively, naturally and in response to time pressure (Baron, 2005). The conceptualization of multitasking as multiple activity conduct *in a given time period* is central to the debate that follows.

The recognition of the existence of multitasking has implications for the definition of time, particularly for the construct of clock time, within which time is conceptualized hierarchically, visualized as a single column of data, through which each activity progresses sequentially from one insulated step to another. This linear view of time as 'a moving belt of equal units' (de Grazia, cited Gershuny and Sullivan, 1998: 70) has been criticized by authors, including Adams (1995), as being ignorant of the multiple and complex aspects of time; the 'multiple aspects, rhythms, density, mental states, simultaneity' of time (Paolucci, cited Gershuny and Sullivan, 1998: 74). Robinson and Godbey (1997) conceptualize multitasking as the 'deepening' of time, although it may be more useful to consider the *broadening* of time, such that time is seen as a horizontal, non-linear entity, rather than a vertical, linear entity. In this sense, each constituent of clock time has multiple parallel constituents, in which activity participation takes place. It is these parallel constituents of clock time that are considered when multitasking is recorded and analysed and it is upon this aspect of time that this article is focused.

Multitasking: A Brief Literature Review

Studies have shown that up to 95 per cent of the population report multitasking each day. Also, people report participating in more than one activity concurrently for approximately one third of the day (Hungerford, 2001; see also Bittman and Wajcman, 2000; Floro and Miles, 2001; Ruuskanene, 2004). There is consensus in the literature that failure to recognize multitasking has distorted the picture of popular time use, leading to a biased account of the amount of time that people devote to different activities. It can also lead to errors in measuring *change* in activity participation, suggesting substitution effects where, in fact, activities are *added* to daily life (Floro and Miles, 2003). In this sense, activity participation is no longer reduced to a zero sum game, in which the addition of one activity requires the subtraction of another. Rather, total activity participation is increased as time use is intensified.

Some activities are more likely to be recorded as secondary activities than as primary activities. The literature identifies the principal activities that individuals tend to record as secondary activities (and which have thus been under-reported when only primary activities are considered) as: childcare (Ironmonger, 2003, citing Bittman and Pixley, suggests that 75% of time spent in childcare is as a secondary activity; see also Folbre et al., 2005), domestic work (Sullivan, 1997; Bittman and Wajcman, 2000), passive leisure and communications activities (Ironmonger, 2003; Baron, 2005). Recently, multitasking has been introduced into the field of transport studies. Research including Laurier (2004), Lyons and Urry (2005) and Kenyon and Lyons (2007) challenges the perception that travel time is unproductive time and highlights the benefits of multitasking whilst travelling for increased participation in communications, leisure and paid work. Therefore, multitasked activities are 'important' – they are not trivial activities, but are both cognitive and social activities that impact upon quality of life and life chances.

It is unclear why participants multitask. The majority of explanations are based upon interpretation of quantitative time-use data rather than upon qualitative studies that seek to discuss the phenomenon with those who (do not) multitask and therefore have limited ability to uncover causal factors. Such explanations suggest that multitasking is born out of necessity, a response to time pressure (e.g. Kitterod, 2001; Ruuskanene, 2004). Thus, for Sullivan (2007), multitasking is 'one possible response to the burden of multiple obligations . . . Multitasking represents a resolution of sorts to the pressure of time for those with a restricted time for a multitude of tasks' (p. 8). This said, a number of studies highlight the benefits of multitasking. For example, Baron (2005) highlights multitasking as allowing participants to exercise control over the degree of attention that they pay to a particular activity (which she terms 'communicative volume control'); and Lyons and Urry (2005) discuss the alleviation of boredom during travel through multitasking. Both cases are informed by a *desire*, rather than a *necessity*, to multitask. For Lyons and Urry, travellers are positively contaminating a *passive* activity. However, Baron (2005) discusses the multitasking of *active* activities, a distinction we will return to in later sections of this article.

These studies suggest that multitasking is differentially distributed across the population. Whilst it is not clear if individual characteristics influence participants' ability or desire to multitask, or the necessity of multitasking, it has been suggested that propensity to multitask is linked to demographic factors including age, culture, educational attainment, employment status, gender, household lifecycle and income (Floro and Miles, 2003), each of which have been associated with the experience of stress and time pressure (Ruuskanene, 2004). Through analysis of multitasking, studies have revealed: the true extent of gender inequity in unpaid productive work, particularly through the study of childcare activities (e.g. Kreitzman, 1999; Bittman and Wajcman, 2000;

Ironmonger, 2003); the contamination of women's leisure time (Bittman and Wajcman, 2000; Sullivan, 1997); the use of passive leisure to increase enjoyment of certain tasks (Bittman and Wajcman, 2000; Sullivan, 1997); the productivity of elderly adults (Hungerford, 2001); and the impacts of multitasking for stress and well-being (Floro and Miles, 2003; Southerton and Tomlinson, 2005), particularly in relation to the concept of 'busyness' (Sullivan, 2007). In consequence, these studies have exposed greater inequality in unpaid work and access to leisure time than previously recognized and increased stress as a result of multitasking. However, they have also introduced the idea of positive contamination of activities (Floro and Miles, 2003; Ruuskanene, 2004), greater status through busyness (in leisure and work) (Sullivan, 2007) and the possibility of an increase in total activity participation (Mokhtarian et al., 2006; Sullivan, 2007), each of which may reduce social exclusion (Kenyon and Lyons, 2007).[1] Thus, analysis of multitasking could have important implications for the understanding of the experience of time and of well-being, inequality and disadvantage in society.

Therefore, the literature confirms the importance of secondary activities in daily life, highlighting the importance of multitasking for the understanding of activity participation and time use. None of the aforementioned studies incorporate consideration of the influence of Internet use upon multitasking, being primarily based upon time-use data collected before the Internet became universally available. However, there are potentially important implications of Internet use for multitasking and, therefore, for debates regarding change in time use and activity behaviour. It is to this that this article now turns.

Multitasking and Internet Use

Scholars are now beginning to question the impacts of Internet use for the study of time, considering both its conceptualization and the patterns of its use. Whilst the field is in its infancy, such research suggests that the way in which we conceptualize and use time is changing in response to widespread Internet use. Considering the *conceptualization* of time, Hassan (2003) progresses the debate from that of 'real time' as a new temporality (advanced by authors including Castells, 1996). Hassan steps away from notions of timelessness and the death of clock time, which are implied in discussions of real time, instead advancing the notion of 'network time': 'A new and powerful temporality that is beginning to displace, neutralize, sublimate and otherwise upset other temporal relationships in our work, home and leisure environments' (Hassan, 2003: 226). In network time, activities are no longer governed by the rule and pace of the clock. Rather, interpretation of his analysis of the production of knowledge suggests that there appears to be the beginning of a return to task time – in which one is

governed not by the temporality of the clock but by the task, and in which what is possible is not dictated by the pace of clock time but the instantaneity of network connections. Westenholz (2006), in her discussion of the construction of time by information technology (IT) workers, similarly promotes the idea of change in the perception and use of time at work, in response to IT, such that the dominance of clock time in the governance of the working day is diminished.

Considering time *use*, studies in which Internet use has been included as a discrete category of time use within time-use diaries have been slow to emerge. Anderson and Tracey (2002) is a rare example of time diary research into the effects of Internet use that considers *total* activity participation. In the main, debate has centred on the impacts of time spent in Internet-related activities for time spent in social activities (for example, Kraut et al., 1998, 2002; Nie et al., 2002; Gershuny, 2003) and time spent travelling (including Mokhtarian and Salomon, 2002; Choo et al., 2005). These debates have been polarized along the lines of 'Internet good/Internet bad', perhaps reflecting the novelty of the field of study. Despite disagreement over the direction of the effects of Internet use, all of these authors, with the exception of Anderson and Tracey (2002), agree that there are likely to be substantial impacts of the Internet for time use.

A third area in which scholars within the field of time studies have considered the impacts of the Internet is that of space-time interactions. Hagerstrand's (1970) 'time–space prism', through which the author illustrated the influence of time upon geographical accessibility, has been adapted by authors including Couclelis (2004) to reflect the time–space compression that results through Internet use. Kwan (2000) suggests that, with the Internet, 'space–time convergence is literally complete' (p. 23); activities are 'placeless and timeless' (Kwan, 2001: 24). Such theorists posit the 'death of distance' as a result of Internet use. We may here extend this conceptualization to include, if not the death of time, the demise of the importance of time in governing our activity participation, as activities can be asynchronous, conducted at any time and in quick time.

The aforementioned review suggests that progress is being made in the incorporation of the study of Internet use into theoretical conceptualizations of time, studies of time use and analysis of space–time interactions. However, the concept of multitasking is notably absent from the literature reviewed earlier, reflecting its near-absence from the time-use literature in general. I have identified just three studies, in the field of time-use research, that incorporate consideration of the influence of Internet use upon multitasking.[2] Each suggests that consideration of multitasking is fundamental to the understanding of the effects of Internet use upon time use. Anderson and Tracey (2002) and Nie et al. (2002) suggest that changes in primary activity participation that are attributed to the displacement effect of Internet use in fact disappear when secondary activities are included in the analysis. Therefore, the authors suggest that the effect of Internet use may enable greater multitasking; that Internet use is added to exist-

ing activities rather than standing in a zero sum relationship to existing activities. A third study corroborates this finding. Robinson et al. (2002) find that Internet users multitask significantly more than non-users. Whilst no direct causality is attributed, the authors are clear in their suggestion that the Internet is a 'time enhancer'. In correspondence with Anderson and Tracey (2002) and Nie et al. (2002), Robinson et al. deny that Internet use has led to a decrease in before-Internet activity participation in any sphere. Again, challenging the zero sum relationship identified in the majority of studies, the authors state that 'people do not seem to be forced to give up other activities to accommodate [Internet use]' (Robinson et al., 2002: 257). Rather, Internet use enables the more productive use of time, which we can assume is, at least in part, linked to its role in enabling multitasking.

There are a number of reasons for suspecting that Internet use may enable greater multitasking. The first relates to the Internet's ability to enable the *spatial and temporal co-presence* of two or more activities. A prerequisite of multitasking is that two or more activities must be spatially co-present; individuals may undertake two activities simultaneously but they cannot be in two locations simultaneously. A key opportunity stemming from Internet use arises from the ability to 'bring' activities to the individual, rather than the individual needing to physically travel to the activity. In this sense, 'virtual mobility', via the Internet, can overcome spatial barriers to participation, enabling the *spatial co-presence* of activities and therefore their simultaneous conduct at a single location. Through virtual mobility, activities that traditionally require physical mobility (travel) can now be undertaken without recourse to physical travel by the individual undertaking the activity. Thus, virtual mobility can create accessibility opportunities, both substituting for physical mobility and enabling access where previously there was a mobility deficit (on the influence of the Internet upon geo-spatial accessibility, see initially Couclelis, 2000, 2004; Kwan, 2000). In addition, virtual mobility can overcome temporal barriers to participation, both enabling and overcoming the need for *temporal co-presence*. A great benefit of online activities is that they can be conducted at any time. For example, when one can complete an application for social support online at any time, the opening hours of the local government office are no longer a constraint upon this. In addition, activities can be suspended and rejoined such that a single activity is undertaken at multiple times. Thus, online grocery shopping can be undertaken during multiple time periods throughout the day, as time becomes (un)available.

Therefore, virtual mobility, via Internet use, loosens the traditionally close links between activity, space and time. Many activities can be conducted anywhere, at any time. The implications of this for activity participation are clear. Virtual mobility has been shown to increase access to activity participation, enabling greater participation in activities, including: education, at all levels

(Hellawell, 2001; Hramiak, 2001; Cameron, 2002; Gorard and Selwyn, 2005); employment, through greater access to information, training, application and the job itself (Braithwaite and Johnson, 2000; Chow et al., 2000; Robson, 2001; McQuaid et al., 2003); healthcare, in terms of support and treatment (e.g. Burrows et al., 2000; Nettleton and Burrows, 2003; Silber, 2003; Fox, 2005; Social Exclusion Unit, 2005); political participation (e.g. Klein, 1999; Mele, 1999; Gibson et al., 2002; Horton, 2004); and social networks (e.g. Rheingold, 2000; Hampton, 2002, 2003; Wellman and Haythornthwaite, 2002; Nettleton et al., 2002; Davies, 2003; Boase et al., 2006). However, these studies have focused only on Internet use increasing access to participation in the *primary* activity. If online activities can be conducted anywhere at any time, Internet use is therefore likely to also enable an increase in the simultaneous conduct of multiple activities, both online and offline, where previously the locations of these activities (in space and time) would have been separated – with a consequent increase in total activity participation. In this sense, the greater accessibility afforded by virtual mobility is able to meet a latent demand for participation, which is then met, because of time/space constraints, through multitasking. Therefore, Internet use may be expected to influence multitasking in two ways, beyond the mere substitution of activities from offline to online: by increasing the number of activities that can be multitasked (activities *amenable to* multitasking); and by increasing the accessibility of a greater number of activities (activities *accessible for* multitasking).

Therefore, three attributes are likely to influence the degree to which activities can be multitasked (Kenyon and Lyons, 2007):

- The degree of locational and temporal dependence of the activity;
- The necessary degree of continuity of engagement;
- The required degree of active or cognitive attention.

The Internet acts upon each of these in the following ways.

Locational dependence considers spatial co-presence and refers to the extent to which activities must be undertaken at particular locations. Thus, *off*line grocery shopping cannot take place at the same time as preparation of a meal at home, or during caring responsibilities which confine the user to the home. However, *on*line grocery shopping could take place at home at the same time as these activities, because of the reduced locational dependence of one of the activities (grocery shopping).

This example also illustrates the importance of the degree of *continuity of engagement* in the possibility of multitasking, which reflects the notion of temporal co-presence. Preparing the meal is unlikely to require continuous use of time throughout but, rather, intermittent attention, as do caring responsibilities; and the time devoted to the task of online shopping can be intermittent, allowing the user the freedom to break the activity, in response to the demands

of other activities (in this example, cooking or caring). Thus, each is amenable to multitasking (in a given time period).

Finally, considering the degree of *active* or *cognitive attention* required for the task, multitasking is more likely to be possible for activities with a lower cognitive burden and requiring less active attention. Thus, Baron (2005) suggests that, whilst social activities are highly amenable to multitasking, cognitive activities are less so, because of the higher cognitive burden of such activities and consequent degradation of performance when they are multitasked. Budig and Folbre (2004) consider active multitasking whilst engaged in passive childcare, as in the earlier example; Lyons and Urry (2005) consider active multitasking whilst engaged in passive travel. This suggests compatibility between active and passive activities, which may not be true of two or more active activities but which we might expect to exist between two or more passive activities.

Therefore, not all activities are amenable to multitasking. However, by altering geo-spatial accessibility constraints, Internet use is increasing the number and variety of activities that are amenable to and accessible for multitasking. Therefore, it seems reasonable to expect that Internet use will facilitate greater multitasking, if we assume a latent demand for multitasking in response to time pressure and other positive factors listed previously – or, at least, that Internet use will alter the pattern, if not the volume, of multitasking in society. Should this be the case, there are likely to be important implications for time-use scholars in two principal ways:

- If we are multitasking more in the information age, this increases the importance of multitasking to the understanding of the ways in which we spend our time in modern society;
- If we seek to understand the impacts of Internet use for time use, we must record and analyse multitasking data to enable us to examine the extent to which online activities are being added to, rather than substituted for, daily life. This is particularly important in light of the types of activities (identified previously) that tend to be recorded as secondary activities, which are also the most common online activities. This may then lead us away from the simplistic substitution debates that have dominated the field thus far.

This article now turns to consider the extent to which the empirical evidence supports the theoretical discussion, considering whether or not multitasking is more prevalent when activities are conducted online; and whether or not this is important for our understanding of time use in the information age.

Methodology

Study 1: Longitudinal, panel-based diary study

The accessibility diary was designed to incorporate recording of the use of information and communications technologies (ICTs) alongside daily activity participation. The diary was concerned in the main with the observation of the interactions between online activity participation and travel, reflecting the principal focus of the research. Multitasking behaviour was also recorded and it is on these data that this article is focused.

Participants completed the diary for seven days in March 2004, September 2004 and March 2005.[3] Users were asked for six pieces of information: 1) what they did; 2) the start and 3) the end times of the activity; 4) the participation or 5) the presence of others; and 6) what else they were doing at the time. The diary offered the following instructions with regard to the recording of secondary activities:

> Many people do a number of things at the same time, like eating dinner and watching TV; or driving a car and talking to a friend. If you were doing something at the same time as your main activity, please tell us about it in these columns. We need to know what you were doing and roughly how long you were doing it for. For example, if you are at work, you might spend about 15 minutes of the day sending personal emails; or perhaps you spend 10 minutes of your lunch break walking to the shops, with 10 minutes shopping for groceries.

Therefore, participants decided for themselves which activities they felt were primary and which were secondary and when to record a change in primary activity, or when to retain the primary activity and record an additional secondary activity. Focus groups conducted as part of the study suggested that most respondents listed activities as primary according to the level of energy or cognitive attention that they required (see Bittman, 1992, cited Budig and Folbre, 2004). Space was provided for up to three secondary activities, in addition to the primary activity. Participants recorded only the duration of secondary activities – the start and end times were not recorded, to reduce respondent burden. Therefore, it is not possible, with this diary instrument, to uncover the precise sequencing of secondary activities, nor to associate secondary activities with other secondary activities. For example, if a primary activity is recorded as thirty minutes, with three secondary activities recorded as ten minutes each, it is not possible to ascertain whether the secondary activities occurred in sequence (primary plus secondary 1, followed by secondary 2, followed by secondary 3) or in combination (primary plus secondary 1, 2 and 3; primary plus secondary 1 and 2 for ten minutes, primary alone for ten minutes, primary plus secondary 3 for ten minutes, etc.). For this reason, it is not possible to associate activities with others to assess why certain activities are associated with others. While we can

associate a primary with a single secondary activity, in light of the presence of multiple secondaries, we cannot confidently suggest a causal link between the primary and single secondary activity for this may be influenced by the other activities taking place, which may happen concurrently or in sequence. This may be considered to be a flaw in the methodological design. Thus, the results section presents analysis at the aggregate level only. Diary design is given as Figure 1. The diary used 89 pre-coded activity categories, designed with study objectives in mind. Pre-existing categories were rejected in light of their inability to record online and travel behaviours to the level of detail required for this study. A full list of codes is given as Figure 2. Full discussion of the diary design and codes, in relation to the multidisciplinary literature, is given in Kenyon (2006b).

In common with many time-use studies, during the analysis a number of composite activities were created from the activities listed. For example, Gershuny (2003) records 40 different activities, but for analytical purposes creates just four composite activity categories: paid work, unpaid work, leisure and sleep. Robinson (1999) recodes into four categories: contracted time, committed time, personal time and free time. In a later study, Gershuny (2005) creates eight composite activities from in excess of 200 recorded activities: paid work, unpaid work, shopping, leisure out of home, sleeping and personal care, eating at home, media-related leisure and other home leisure. Each categorization reflects the focus of the research. Whilst some level of detail is lost through categorization, it reduces the complexity of the data and allows meaningful (statistical) analyses.[4] The activities selected for analysis reflect the research focus and are 'key activities' not in terms of prevalence in relation to other activities, but in relation to the principal subject under investigation in this study, being likely to influence the experience of exclusion and being susceptible to substitution from offline to online, hence having effects for transport. This article presents data for education, information search, paid work, shopping, social networks activities, total Internet activity and total travel activity. Details of composite activities are given as Table 1. Personal data were collected in a face-to-face interview, during which full instructions and one-to-one training were provided. Participants received a cash incentive upon the return of a completed diary (£25 for the first two diaries and £35 for the third). The diary was issued as a professionally printed, 28-page A4 booklet and was returned to the project team in a postage-paid envelope.

Longitudinal analysis found no evidence of change in activity participation over time for this sample, for the composite activities, for the whole sample and for the demographic subgroups considered.[5] Therefore, an alternative analytical approach was implemented using a composite database (n = 96). The composite database detailed the average time spent doing each activity, per person, per week, taking an average across the weeks in which each individual participated.[6] As such, it is the equivalent of conducting a three-week diary for the majority of participants.[7]

Day(s) .....

What did you do? Please write code for **one main** activity	Start time	End time	Where did you do it? E.g. at home; at office; between home and work	Did anyone else do this with you? Yes / No	Was anyone else around at the time? Yes / No	What else were you doing? Please enter code and duration for up to three additional activities					
						Code	Dur.	Code	Dur.	Code	Dur.
	:	:									
	:	:									
	:	:									
	:	:									
	:	:									

FIGURE 1
The accessibility diary

Communicating

C1	Face to face
C2	By telephone (landline)
C3	By mobile telephone
C4	By text, or video messaging
C5	By letter
C6	By fax
C7	By email
C8	In chat room
C0	Other communicating
C0I	Other communicating – Internet

Entertainment / recreation

E1	Resting, relaxing
E2	Reading
E3	Do hobbies
E4	Play sports
E5	Cinema, theatre, watch sport, etc.
E6	Social (pub, club, bingo…)
E7	Watching TV, video, DVD
E8	Listening to music, radio
E9	Travelling for pleasure
E10	Surfing (no specific purpose)
E11	Playing computer games
E0	Other entertainment / recreation
E0I	Other entertainment / recreation – Internet

Formal activities

F1	Paid work
F2	Education
F2I	Education – Internet
F3	Voluntary work
F3I	Voluntary work – Internet
F4	Religious activity
F4I	Religious activity – Internet
F5	Campaigns, civic
F5I	Campaigns, civic – Internet
F0	Other formal activities
F0I	Other formal activities – Internet

Household and personal

H1	Sleeping
H2	Personal care
H3	Eating, drinking, inc preparation
H4	Housework, household maintenance
H5	Childcare
H6	Other caring activities
H7	Running errands (e.g. posting a letter)
H8	Escort (includes school run)
H9	Banking, financial
H9I	Banking, financial – Internet
H10	Medical (includes GP, hospital)
H0	Other household and personal

Information search

I1	Trivia
I1I	Trivia – Internet
I2	Window shopping
I2I	Window shopping – Internet
I3	Journey information
I3I	Journey information – Internet
I4	Employment information
I4I	Employment – Internet
I5	Hobbies
I5I	Hobbies – Internet
I6	Medical (inc. NHS Direct)
I6I	Medical – Internet
I7	News (includes TV, newspaper)
I7I	News – Internet
I0	Other information search
I0I	Other information search – Internet

Shopping for

S1	Groceries (main)
S1I	Groceries (main) – Internet
S2	Groceries (top up)
S2I	Groceries (top up) – Internet
S3	Clothing
S3I	Clothing – Internet
S4	Music
S4I	Music – Internet
S5	Journeys (**not** holidays)
S5I	Journeys (**not** holidays) – Internet
S0	Other shopping
S0I	Other shopping – Internet

Travel

T1	Driving the car
T2	Travelling in car as passenger
T3	Travelling on bus
T4	Travelling by coach
T5	Travelling on train
T6	Riding motorcycle or similar
T7	Travelling in taxi
T8	Riding bicycle
T9	Walking
T10	Travelling on an aeroplane
T0	Other travel

Other / Personal

O1	Other activities
O1I	Other activities – Internet
O2	Personal activities
O2I	Personal activities – Internet

FIGURE 2
Activity codes

TABLE 1
Composite activities and associated activities

Composite activity	Associated activities
Education	F2 – education; F2I – education online.
Information search	I1 – trivia; I1I – trivia online; I2 – window shopping; I2I – window shopping online; I3 – journey information; I3I – journey information online; I4 – employment information; I4I – employment information online; I5 – hobbies information; I5I – hobbies information online; I6 – medical information; I6I – medical information online; I7 – news; I7I – news online; I0 – other; I0I – other online.
Paid work	F1 – paid work.
Shopping	I2 – window shopping; I2I – window shopping online; S1 – groceries (main); S1I – groceries (main) online; S2 – groceries (top up); S2I – grocers (top up) online; S3 – clothing; S3I – clothing online; S4 – music; S4I – music online; S5 – journeys; S5I – journeys online; S0 – other; S0I other online.
Social networks	C1 – face-to-face communications; C2 – telephone; C3 – mobile phone; C4 – text; C5 – letter; C6 – fax; C7 – email; C8 – chat room; C0 – other; C0I – other online; E3 – hobbies if with others; E4 – sports if with others; E5 – cinema, etc. if with others; E6 – social; F4 – religious; F4I – religious online; F5 – civic; F5I – civic online.
All online activities	C7 – email; C8 – chat room; C0I – other communications online; E10 – surfing; E0I – other entertainment online; F2I – education online; F3I – voluntary work online; F4I – religious online; F5I – civic online; F0I – other formal online; H9I – banking online; I1I – trivia online; I2I – window shopping online; I3I – journey information online; I4I – employment information online; I5I – hobbies information online; I6I – medical information online; I7I – news online; I0I – other information online; S1I – groceries (main) online; S2I – groceries (top up) online; S3I – clothing online; S4I – music online; S5I – journeys online; S0I – other shopping online; O1I – other activities online; O2I – personal activities online.
All travel activities	E9 – travelling for pleasure; H8 – escort; T1 – driving the car; T2 – car as passenger; T3 – bus; T4 – coach; T5 – train; T6 – motorcycle; T7 – taxi; T8 – bicycle; T9 – walking; T10 – aeroplane; T0 – other travel.

Sample

The study employed theoretical sampling – sampling from (researcher-constructed) groups – with the purpose of furthering theoretical and methodological development (Glaser and Strauss, 1967).[8] A number of recruitment strategies were employed, the principal being snowballing from key contacts within the community. Press coverage was also effective in recruitment. A total of 92 participants were recruited for the first wave. Of these, 87 participants returned their diary; 85 were complete and usable. In all, 69 participants completed and returned usable diaries for all three waves, representing 79 per cent of initial participants. A further nine participants were recruited prior to the second wave. In total, 96 participants completed and returned at least one diary; 7 completed only one and 20 completed two diaries. Analysis suggests that attrition was random and was not selective by demographic variables: the sample did not vary significantly in composition between waves, nor did the composite sample differ significantly from the initial sample or the longitudinal sample. Table 2 presents details of the longitudinal sample (n = 96), divided into the demographic categories used in the analysis, alongside the national Internet user profile and/or the national population, where possible.

Table 2 shows that the sample contains a range of income types. However, it proved difficult to recruit participants with Internet access in lower income deciles. Thus, the sample over-represents those in higher income deciles but is reflective of the national Internet access profile. The sample is mixed in terms of Internet experience, with a fairly even spread across the years since first use. Comparable national data are not available. The majority of participants have gained home access in the past five years. This is in line with the national profile (Office for National Statistics, n.d. b). However, the sample over-represents participants with access to broadband, vis-à-vis the national profile. Considering travel mode use, the analysis was only for car use, because of the low use of the majority of modes. Thus, the data were analysed in the following subgroups: first, by the number of cars in the household, which was higher than the national average; second, individual availability of the car, which was on a par with the national average; and third, by mode use, considering daily, weekly and less than weekly car use, which, as Table 2 shows, closely reflects the national profile. The sample is varied in terms of location, but is not representative of the national average. The sample also over-represents females and those with higher educational qualifications, when compared with the national average.

In summary, the sampling strategy aimed to achieve a mixed rather than a representative sample. However, the sample is broadly in line with the national Internet user population. This said, a greater number have access to broadband, compared to the national population, and there were more females. Studies suggest that broadband users behave differently to dial-up users (Horrigan and Rainie, 2007), spending more time online and participating in more and varied

TABLE 2
Sample profile: diary study

Characteristic	Composite sample (%)	National population[a] (%)	
Annual household income (excl. refusals) [b]			
Below average household income	37.4	50	Not obtained
Above average household income	46.9	50	
1st and 2nd quintile	7.2	40	12, 14, 23, 31
3rd quintile	30.2	20	42, 48
4th quintile	27.1	20	57, 69
5th quintile	19.8	20	74, 85
Years since first ever use of the Internet			
2 years or less	13.6		
3–4	20.8	not obtained	
5–6	21.9		
7–8	21.9		
9+	21.7		
Years since first home use of the Internet			
2 years or less	36.4		
3–4	21.8	not obtained	
5–6	22.9		
7–8	10.4		
9+	8.3		
Broadband access			
Dial up	58.2[c]	72.9[d]	
Broadband	41.8	27.1	
Mode use – car[e]			
Daily	45.8	not obtained	
Weekly	83.3	84[f]	
Less than weekly	16.6	not obtained	
Residential location			
Small village (Stogumber, Somerset)	12.5	2[g]	
Large village (Sandford, Devon)	16.7	17	
Market town (Crediton, Devon)	13.5	49	
Large town (Taunton, Somerset)	18.8		
Outer city suburbs (Bristol)	17.7	24	
Inner city suburbs (Bristol)	20.8	8	
Age (08/03/04)			
16–24	9.4	14.4[h]	92[i]
25–34	25.0	17.5	81
35–44	26.0	18.8	
45–54	18.8	16.3	67
55–64	15.6	13.8	48
65+	5.2	20.0	17

continues

TABLE 2 (cont.)

Characteristic	Composite sample (%)	National population[a] (%)
Gender		
Male	42	49[h]
Female	58	51
Education		
No formal qualifications	3.1	36[h]
Lower level qualifications (up to diploma)	53.2	44
Higher level qualifications (first degree +)	43.7	20

[a] Variously defined: see footnotes; [b] National average annual household income was £27,300 (ONS, 2003a). Given the structure of the dataset, this is taken as up to £26,999 and £27,000 and over; [c] Per cent of those in each decile online, March 2004 (ONS, 2003b); [d] Data is for those who did not change their subscription during the study (n = 79); [e] ONS (2005); [f] 2004 data (DfT, personal communication); [g] British Social Attitudes Survey (Stratford and Christie, 2000); [h] National population (ONS, n.d. a); [i] Per cent of those in age group who have ever used the Internet (ONS, 2003b).

online activities (doing on average seven online activities per day compared with three for dial-up users). Their 'always on' status, continued availability of a telephone line for voice communication, high speeds and fixed price of access means that the Internet is more immediately accessible for broadband users, which may be expected to influence multitasking behaviour. Similarly, studies cited earlier suggest that women multitask more than men. Therefore, this sample may be expected to multitask more than a sample representative of the national Internet user profile.

Study 2: Questionnaire survey

In February 2006, 1000 weekly Internet users resident in Great Britain completed and returned an online questionnaire. The questionnaire was concerned with the extent of offline and online participation, travel behaviour and interactions therein. It was designed to take 20–30 minutes to complete and used a template that has been usability-tested. The questionnaire included a number of questions about multitasking and it is upon these questions that this article is focused. First, participants were asked to consider the factors that influence their decision to undertake certain activities online rather than offline. This question was filtered on an earlier question, such that participants were only asked about activities that they currently undertake online. Participants were asked whether or not they agreed with a number of statements, each naming a factor that may

influence their decision to participate online, rather than offline, for each key activity.[9] The order of the statements was randomized, to reduce bias. Concerning multitasking, participants were asked if they agreed with the following:

> I can do other activities at the same time as doing [activity] online.

Participants who suggested that this was a factor in their decision to conduct activities online rather than offline were asked two further questions about multitasking: whether or not they can multitask more when online than when offline, for each activity; and to provide any further comments on multitasking in an open text box. In this survey, multitasking was defined in the following way:

> We call doing an activity at the same time as another activity 'multitasking'.

Sample

The questionnaire was initially distributed to 909 participants who had previously completed a questionnaire within this study; 220 replied. A second mailing was distributed one week later to members of an online panel of survey respondents.[10] In all, 12,000 members representative of the national Internet user profile were invited to take part. Recruitment was halted when the target of 1000 participants was reached. Table 3 presents details of the sample alongside the national Internet user profile and/or the national population, where possible.

The sample over-represents those in higher income deciles compared with the national population but this reflects the national Internet access profile. The sample also over-represents those with greater Internet expertise and who spend a greater amount of time online than the national Internet user population, which is perhaps to be expected from an online survey. Considering travel mode use, the sample shows a profile broadly in line with national statistics, and a residential profile that is, again, broadly in line with national statistics. Finally, considering age, the sample over-represents younger people compared with the national average but is in line with the national Internet user profile; and is broadly representative in terms of gender.

In summary, the sample is broadly in line with the national Internet user profile, but participants spend a greater amount of time online per week (as a primary activity) and have higher expertise than the average Internet user. These characteristics are correlated. Whilst there is no published evidence to suggest that these characteristics will influence multitasking behaviour, greater expertise may suggest greater capability to multitask online; and more time online gives more capacity to multitask online. However, it is not anticipated that this will influence the conclusions drawn in this article.

TABLE 3
Sample profile: questionnaire survey

	Sample (%)	Weekly Internet users (GB) (%)[a]	National population (%)
Annual household income (income deciles)			
Less than £5,999	4[b]		10[c]
£6,000–12,999	12		20
£13,000–16,999	10		10
£17,000–21,999	11	Not obtained	10
£22,000–£26,999	13		10
£27,000–£33,999	14		10
£34,000–£41,999	13		10
£42,000–£55,999	13		10
£56,000 or more	11		10
Time on Internet last week			
Up to 3 hours	6	32	
3–5 hours	11	22	Not obtained
5–10 hours	18	20	
10+ hours	65	24	
Internet expertise			
Beginner	6	24	
Quite knowledgeable	34	45	Not obtained
Quite advanced	38	22	
Expert	22	8	
Mode use – use of mode weekly			
Car/van	81		84[d]
Bike	9	Not obtained	14
Bus	24		27
Train	10		–
Residential location			
Remote	2		2[e]
Village	21		17
Town	42	Not obtained	49
City (suburban)	22		24
City (inner)	13		8
Age			
24 and under	19	19	31
25–34	23	23	14
35–44	23	24	15
45–54	17	17	13
55+	18	17	27

continues

TABLE 3 (cont.)

	Sample (%)	Weekly Internet users (GB) (%)[a]	National population (%)
Gender			
Male	51	48	51[f]
Female	49	52	49

[a] Data from GfK NOP Internet User Profile Survey. Figures for GB weekly Internet users aged 16+. Categories, with the exception of income, were defined by GfK NOP; [b] Percentage excludes those selecting 'Don't know' (4%) and 'Prefer not to say' (18%); [c] National income deciles taken from ONS (2003a). An error in the questionnaire led to deciles 2 and 3 being recorded together; [d] DfT (2001); car use data for 2004, personal communication; [e] British Social Attitudes Survey (Stratford and Christie, 2000); [f] ONS (n.d. a).

TABLE 4
The prevalence of multitasking (mean minutes per day), with indication of variability (n = 96)

	Mean minutes per day			
	Mean	Median	Mode	Standard deviation
Secondary activity 1	307.3	285.0	165.0*	176.4
Secondary activity 2	95.2	66.7	0	95.3
Secondary activity 3	32.4	15.0	0	46.4
Total	434.9	398.3	195.0	274.4
Total (hours)	7.2	6.6	3.0	4.6

* Multiple modes exist. The smallest value is shown.

Results: Diary Study

How prevalent is multitasking?

Multitasking is very common for this sample. All participants report multitasking at some stage for every survey week, and an incidence of multitasking (with at least one activity recorded in parallel with a primary activity) is recorded on all but 1.5 per cent of participant days during the entire study.[11] Table 4, detailing time spent multitasking in all recorded activities, shows that multitasking 'adds' on average more than seven hours to each day, totalling an addition of more than 50 hours to the average week (corresponding with Ironmonger, 2003, in which multitasking was seen to add 7.5 hours to the average day). Thus, for this sample, multitasking 'adds' 30 per cent more time to each day and 45 per cent more time to each waking day.[12]

Table 4 highlights the variation in reported multitasking by this sample. If the propensity to multitask differs according to characteristics, as suggested in the literature reported earlier, the effects of multitasking (which could be both positive and negative) are likely to be unequally distributed across society. However, the extent to which this variation can be explained by characteristics is unclear. Comparisons between the mean number of minutes spent multitasking for different groups hint at differences between certain characteristics (including age, income, car availability, car use and residential location) and the propensity to multitask, but these differences are not statistically significant (one-way ANOVA, significance level $p < .05$). Of particular note is that, contrary to expectations and to findings reported in Robinson et al. (2002), Internet use, in terms of total time spent online (for the sample divided in two and into quartiles), Internet experience or mode of access to the Internet, are not linked to an increase in total time spent multitasking. This may be due to Robinson et al. contrasting users and non-users rather than types of user, as in this study; or to the small sample size and high degree of variability influencing statistical tests.

The variability may be explained more by different completion strategies than by demographics. As mentioned previously, participants were instructed to judge for themselves which activities they felt were primary and which secondary – and therefore when to record a change in primary activity, or to retain the primary activity and record an additional secondary activity. Whilst participants' reported strategy was to prioritize the activity requiring most cognitive attention, the possibility that the decision was made more on the basis of how much effort the participant was willing to expend cannot be discounted. In light of the variability recorded, the ambiguity introduced by this methodological approach may be considered to be a disadvantage in this study. This is considered more fully in the following discussion.

How important is multitasking?

The previous discussion has considered the *propensity* to multitask for this sample, suggesting that multitasking is common and that there is no significant difference in the propensity to multitask by the demographic characteristics considered, including time spent online during the survey week. The following discussion considers the *importance* of multitasking, in terms of its influence upon our understanding of the nature of activity participation.

Table 5, which focuses upon composite activities, demonstrates the distorted picture of time use and activity participation that emerges when only primary activities are considered. The recording of multitasking increases the recorded time spent in all activities and changes our perception of the proportion of the day that is devoted to different tasks. Pertinent to this article is that recorded time spent in online activities increases by 60 per cent when multitasking is

TABLE 5
Assessing the importance of multitasking: mean minutes per week spent in primary and secondary activities (n = 96)

Activity	Mean minutes per week			Secondary activity time as % of primary activity time
	Primary	Secondary	Primary plus secondary	
Education	160.3	10.4	170.4	6.5
Information search	112.2	44.8	157.0	39.9
Paid work	1478.6	15.8	1494.4	1.1
Shopping	153.8	32.3	186.1	21.0
Social networks	594.0	1152.9	1746.9	194.1
All online activities	**215.5**	**128.5**	**345.0**	**59.6**
All travel activities	682.2	71.3	753.5	10.5

included. In other words, if only primary activities had been recorded, our understanding of the time that participants spend online would decrease by 37 per cent. In addition, reporting primary activities alone under-records social networking activities by two-thirds. The principal area of debate regarding the impact of the Internet has concerned the social effects of its use; namely, that online time reduces time spent in social networking activities. These data suggest that debates regarding the impacts of Internet use for social networks must take account of multitasking if they are to accurately record any change in the same. It is also likely to be important to consider multitasking in the second area of debate identified in this article: travel behaviour change in response to Internet use. One minute in every ten spent travelling is unreported when only primary activities are considered. However, the data suggest that multitasking is of less importance for our understanding of participation in education and work activities, two key indicators of social participation.

The earlier discussion highlights that multitasking is not randomly distributed across activity types. Rather, different activities appear to be more amenable to being secondary activities. The most powerful explanatory model, with reference to those outlined previously, is that reflecting the cognitive/social balance of activities, identified by Baron (2005) and the completion strategy identified by participants: activities with a high cognitive load (paid work, education) are, in the main, recorded as primary activity; those with high social content (social networks, shopping), as secondary. This explanatory model suggests that online activities have a relatively high social rather than cognitive content, in light of their propensity to be recorded as secondary activity. Whilst data on the amount of time spent in different online activities each day are not available, data on the percentage of American Internet users who report the online activities that they

TABLE 6
Percentage of primary activity time involving multitasking, by activity category and offline/online status (wave 1) (n = 86)*

	Total secondary activity time as a percentage of total primary activity time		
Primary activity type	Total time (%)	Primary is offline (%)	Primary is online (%)
Education	23.0	20.8	63.3
Information search	42.5	38.8	45.3
Paid work	28.4	28.4	–
Shopping	36.3	32.4	57.9
Social networks	56.3	58.9	38.6
All online activities	**44.7**	**–**	**44.7**
All offline activities (excl. sleeping)	42.8	42.8	–
All travel activities	60.0	60.0	–

* Because of the need to associate primary and secondary activities, the composite database could not be used. Therefore, the Table presents wave 1 data only. Results for waves 2 and 3 did not show substantial difference.

undertake on a typical day (Pew Internet and American Life, 2007) support the Internet's primary function as a social tool. This said, one in three social networking minutes are *not* multitasked, suggesting that the cognitive/social model may neglect the cognitive content of some social activities, highlighting the importance of disaggregating the variable in future analyses. That two of every three online minutes are not multitasked may suggest a higher cognitive load for online activities. An alternative explanation, based upon the active/passive classification of activities identified earlier, is that online activities are more active than passive. However, this theory remains speculative without analysis of association between online and offline activities.

Whilst Table 5 presents the total time spent on an activity in an average week, alongside the split of this total time between primary or secondary activity (thus, for every three minutes spent in social networking activities, two of these are as secondary activity), Table 6 gives the percentage of primary activity time involving multitasking. Table 6 further illustrates that different activities are more amenable to multitasking – in this case, to having activities appended. To an extent, the data support the cognitive/social model outlined earlier with education and paid work (which are cognitive activities), the least likely of the eight composite activities considered to have accompanying activities; and social networking activities being accompanied 56 per cent of the time. That travel

activities, in the main a cognitive activity (assumed in light of the high level of car use and low use of public transport modes by this sample – see Table 2), are accompanied is perhaps surprising. This highlights the importance of knowledge about the accompanying activity for the understanding of the factors influencing the ability to multitask. As discussed earlier, it is not possible, with these data, to accurately pair activities. Were we able to do so, it is likely that the active/passive distinction would provide a more satisfactory explanation: that the active task of travel was paired with passive tasks, e.g. listening to the radio or childcare. Again, this highlights the importance of disaggregating the variable 'Travel' into its active and passive modes in future studies with larger samples.

Returning to a focus on the influence of Internet use upon multitasking, Table 6 illustrates that the tendency to multitask is heavily influenced by the offline or online status of the primary activity. For the majority of activities, online primary activities are more likely to be multitasked than offline primary activities. For example, when education is undertaken online, it is up to three times as likely to be multitasked as when it is undertaken offline. Online shopping is up to 25 per cent more likely to be multitasked than offline shopping.

It is difficult to explain this difference with reference to either the cognitive/social or active/passive models discussed previously, for why would online education require less cognitive attention, be a less active activity, or be more amenable to being accompanied by certain activity types than offline education? An alternative explanation for this is the reduced degree of locational and temporal dependence of these online activities compared with their offline counterparts, which enables simultaneous activity participation. This supports the suggestion made earlier that the Internet has unique properties which enable multitasking, making more activities accessible and amenable to multitasking and increasing access to activity participation through multitasking. Furthermore, these data strengthen the call for multitasking data to be included in assessments of time use in the information age, plus change in the same.

However, this pattern is not observed for all activities. Social networking activities are up to 20 per cent more likely to be multitasked when offline than when online. This may reflect the degree of active attention required for online social networking activities, because the absence of non-written communication (body language, etc.) demands a more intense focus upon the communications task. However, if we consider all of the activities that are included in this category (Table 1), many are non-face-to-face and many require an active focus, for example playing sport. It may, rather, reflect the degree of continuity of engagement required for online social networking compared with offline social networking. Thus, talking in a chat room may require more constant participation because of the absence of non-written communication. For example, it is difficult to convey comfortable silence online, therefore a break in communication to complete an additional activity may not be possible. An alternative expla-

nation involves the physicality of online social networking: that one is confined to a single location, the PC station (at least, at the time of this survey), such that physical participation in additional activities is less possible.

Finally, considering the data for all online activities and all offline activities excluding sleeping, whilst online activities are multitasked more than offline activities, the difference is less pronounced than for the individual activities discussed previously. Thus, 45 per cent of the time that participants spend online is accompanied, compared with 43 per cent offline. This finding raises the question of whether or not being online is the most important attribute of an activity in determining its suitability for multitasking. It also reinforces the importance of an activity-specific focus in the assessment of the impacts of Internet use and of the analysis of the pairing of activities, to further uncover the attributes leading to multitasking.

Results: Questionnaire Survey

The influence of multitasking upon the choice of online over offline activities

Results from the questionnaire survey support the finding that the offline or online status of the primary activity influences the propensity to multitask. Table 7 details that between 33 and 52 per cent of those undertaking the selected activities online suggest that the ability to multitask influences their decision to participate in the activity online, rather than offline. Thus, 49 per cent of participants consider the ability to multitask whilst online as a factor in their choice of online over offline communication. Furthermore, the ability to multitask is the *third most important* factor (of the 11 given factors) influencing the decision to participate online rather than offline for communications (note: not online social networks, as earlier), education and information search activities. The data would be more powerful if related to a (number of) specific rather than abstract activity episode(s), if data for the choice of offline over online had been collected, or if participants had been asked to qualitatively discuss the factors influencing these decisions. In addition, a number of authors have highlighted the difficulty of collecting time-use data in questionnaire format (Robinson and Godbey, 1997; Gershuny, 2003; Kitterod and Lyngstad, 2005). However, the data highlight the importance of multitasking in the online/offline decision-making process. Also, the difference in the importance of multitasking for different activities supports the diary study analysis in suggesting that there are activity-specific attributes that make multitasking more/less desirable.

Table 8 suggests that the majority of participants believe that they can multitask more when they conduct the five key activities considered in this research

TABLE 7
Which of these factors influence your decision to do your activities online rather than offline?

Benefit of the online activity over the offline activity	Percentage agreement by activity type (%)				
	Communicate with family and friends (n = 962)	Education* (n = 311)	Info. search (n = 925)	Grocery shopping (n = 356)	Other shopping (n = 863)
Any time – more convenient	67	53	83	65	66
Cheaper – save money	51	–	38	16	46
Quicker – save time	42	–	69	35	42
Easier – don't have to carry shopping	–	–	–	60	40
No travel – save money	28	34	41	37	37
No travel – save time	28	36	50	47	43
No travel – more convenient	31	40	52	50	45
No travel – travelling difficult	9	8	10	13	9
Multitasking online	**49**	**36**	**52**	**33**	**34**
Not available offline	15	22	43	10	30
None of the above	10	25	3	10	18

* A mistake in the questionnaire led to unclear results for the cost and speed factors for this activity.

TABLE 8
Can you multitask more when doing the following activities online than when you do them offline? (%)

	n =	Yes	No	Sometimes	Don't know
Grocery shopping	116	74	4	22	0
Non-grocery shopping	291	81	4	13	2
Communicating with family and friends	468	81	3	15	1
Formal education	112	55	10	32	3
Searching for information	478	85	2	13	1

online than when they conduct the same activities offline. With the exception of education-related activities, three-quarters of participants or more agree that online activity participation enables greater multitasking than offline activity participation. When those suggesting that this is sometimes the case are included, we can see that 96 per cent agree that online grocery shopping enables

greater multitasking than offline grocery shopping; 94 per cent, online non-grocery shopping; 96 per cent, online communications; 87 per cent, online education; and 97 per cent, online information searching. These data are unable to tell us why this may be the case but, as before, it is difficult to explain this difference with reference to either the cognitive/social or active/passive models. Rather, the reduced locational dependence of these activities – particularly their ability to be conducted in the home – is the most likely reason.

Qualitative responses

Considering the free-text responses, it emerged that multitasking is part of modern lifestyles, a reaction to busy lives in which participants have multiple responsibilities and tasks to complete. Multitasking was seen as almost universally positive, saving time (both in terms of the speed with which activities can be completed and in terms of saved travel time), allowing participants to 'gain time' and enabling them to make 'better use of available time'. There is a strong sense that multitasking makes life easier, positively contaminating activities – for example, allowing participants to 'work and have fun at the same time'; and increasing their control over their time use, helping participants to 'take control of [their] time and what [they] want to do with it'.

Participants naturally discussed the activities that are most amenable to being multitasked: those that are location independent, those in which a degree of discontinuity is allowed, and those which require only intermittent active attention. Online activities were naturally discussed in this context. In particular, participants highlighted the benefits of Internet use for enabling the conduct of multiple activities during childcare. The convenience of conducting activities online, in the home, rather than offline, out of the home and both actively and passively, which enables participants to multitask more comfortably and effectively, was expressed. The inclusionary benefits are also clear. By allowing activities to be conducted at the same time and in the same location as childcare (and other activities), at (multiple) times convenient to the participant, it is possible to participate in activities that may not otherwise be temporally or spatially accessible.

Alongside childcare, other daily chores and household tasks that traditionally confine the participant to the home can now be conducted at the same time as activities that were previously inaccessible, including education, work, communications and participation in social networks. Therefore, women, who have traditionally been responsible for childcare and other household chores, may be expected to gain the maximum benefit from the increase in multitasking that is facilitated by the Internet.

Discussion

This article has sought to contribute to the debate regarding the impacts of Internet use upon time use, by suggesting that we must take account of multitasking if we are to fully understand time use – and change in the same – in the information age. Results have confirmed the prevalence of multitasking, suggesting that multitasking affects our understanding of time use and the time that we spend participating in different activities. This has been shown to be particularly marked in terms of time online, suggesting that, if we are to fully record and move towards an understanding of change in time use in response to Internet use, we must take account of multitasking.

Whilst suggesting that multitasking is likely to be important for an understanding of change in time use in the information age, the research raises many questions. The extent to which Internet use is facilitating greater multitasking at the aggregate level, or facilitating a change in the pattern of activities with no *net* effect for the volume of multitasking, is unclear. Thus, this study finds that participants multitask for approximately one-third of the day, or seven hours; a finding comparable with studies conducted before the advent of the Internet (Bittman and Wajcman, 2000; Floro and Miles, 2003). That some activities are multitasked far more online than offline is clear. However, this is not clear when we consider *all* offline/online activities, again suggesting that the net volume of multitasking may not be affected; rather, that the pattern of activity participation changes. This raises the question of when activities will be added to daily life and when they will substitute others, returning us to the question of whether or not Internet use stands in a zero sum relationship to other activities, and for which activities.

The question remains as to why multitasking is more common for the majority of activities when they are online rather than offline. Considering the specific characteristics of the online activity that are not shared by the offline counterpart, it is unlikely that the activity itself changes but, rather, that the locational and temporal *context* of the activity changes. By virtue of its being online, the activity becomes more amenable to being interrupted and to being conducted in the home, in the presence of other activities, particularly passive activities that tie the individual to a single location but which do not require full active or cognitive attention. In this sense, the Internet increases the number of activities that are amenable to multitasking, therefore facilitating an increase in the same. Research to uncover the pairing of activities and the influence of location (home/other) upon multitasking will clarify this further, contributing to the debate regarding the zero sum relationship identified earlier.

A number of methodological issues have been exposed relating to the definition, recording and popular awareness of multitasking, each influencing the accuracy of recorded data. Participants in the diary study defined ‘primary’ and

'secondary' activities themselves. A number of problems with this, including the high degree of variability in the recording of multitasking, have been identified. If accurate measures of multitasking are to be achieved, a tighter definition of multitasking will be needed. Further qualitative research is needed to uncover the popular definition of multitasking, considering the factors that determine classification of activities as primary or secondary. For example, are activities classified hierarchically? By what measure – their active or cognitive nature? Should multitasked activities be classified, coded by their active/passive, etc. nature? Such research is needed to uncover the precise nature of this classification, such that future time-use research can ensure a more uniform record of multitasking, with best fit to participants' natural language.

Such research assumes, as do the majority of time-use studies, participant knowledge of the details of their time use. However, studies have suggested that it may be beyond the ability of participants to record their time use for primary activities because of low awareness (Robinson and Godbey, 1997). It is therefore reasonable to ask if participants are sufficiently aware of their secondary activities to accurately record their time use to this degree of complexity. Time-use diaries were developed to overcome the inadequacies of questionnaire data in recording primary activity time use – are they sufficiently robust as a method to accurately record secondary activities, being rooted as they are in the definition of time as clock time? Further research into participant awareness of multitasking and the development of more advanced methods for the recording of polychronic time use, perhaps moving away from the time-use diary (given that it is rooted in monochronic clock time), are essential to the progression of research in this area.

Time-use research is hampered by the burden of our instruments upon participants, a burden that is intensified by the recording of secondary activities. As understanding of time use grows, so does the number of questions that we wish to answer and, consequently, the amount of data that we wish to collect. It is tempting to enhance existing methodologies, continuously adding recorded variables to measure as many aspects of life that may influence time use as possible. However, by doing so, the complexity of surveys increases and so, in parallel, can non-response, both to individual questions within a survey and to the survey as a whole. As a result, there is a danger that, in attempting to collect data on everything, we find in fact that we have data on very little, because our surveys impose too great a cognitive, time or effort burden upon participants. Considering this problem in relation to travel behaviour, Axhausen (1998) concludes that: 'The level of literacy, introspection, conscientiousness, commitment, and free time [necessary to complete such surveys] seem unlikely to be available in many cases' (p. 315). This gives further weight to the call to develop new research instruments to record the complexities of multitasking, rather than simply adding further categories to the time-use diary.

Increased multitasking as a result of Internet use is likely to have implications not only in an academic sense, but for individuals and society. In this relatively new field of study, indications of the social implications of multitasking are mixed. In the literature reviewed earlier, an increase in multitasking has been linked with both increased and decreased stress; with negative and positive contamination of activities; and with increases and decreases in inequality. Multitasked activities have been seen as both important and trivial, and their quality, plus their impact upon the quality of the primary activity, has been questioned. This article has presented emerging findings, aiming to progress the debate with respect to the importance of multitasking for the understanding of the impacts of Internet use. However, further research in the areas identified here is essential if we are to understand (and recommend time-use policies to enhance or counteract) the interactions between Internet use, time use and multitasking.

Notes

An initial draft of this article was presented at the International Sociological Association 2006, Durban, South Africa, 23–29 July. Data were taken from a study entitled '*INTERNET: Investigating New Technology's Evolving Role, Nature and Effects for Transport*', funded by the EPSRC and DfT through the FIT research programme. Research was undertaken whilst the author was employed at the Centre for Transport and Society at the University of the West of England, Bristol. The Principal Investigator was Professor Glenn Lyons. Full analysis of the diary study is given in Kenyon (2006a). The author gratefully acknowledges the support of the funders and of Glenn Lyons throughout this study. Grateful thanks are extended to Ben Anderson and Paul Stoneman for their invaluable discussions; and to two anonymous referees whose comments strengthened this article.

1. This said, should this increase in activity participation be seen to be desirable and without negative effect, there are implications for equality if the ability to multitask is differentially distributed.
2. Whilst the notion of 'real time' implies a degree of synchronicity, this concept has yet to be fully explored in the context of multitasking.
3. Dates were chosen to avoid public/school holidays and seasonal weather variation (Huysmans, n.d.).
4. For this study, with 89 activities plus an additional three secondary activities, there are more than 58 million unique and more than 2 million non-unique activity combinations.
5. Considering descriptive statistics and paired samples *t*-tests, significance $p < .1$. Full analysis of the likely reasons for the absence of a longitudinal effect is outside the scope of this article but include: the study timescale, sample size, the noise of natural behavioural variance (Robinson and Godbey, 1997) and the possibility of behavioural change occurring before the study began. The reader is referred to Kenyon (2006a) for full discussion.
6. Analysis is weekly, to remove daily variation. This is also more appropriate for the majority of statistical tests, which require an independence of observations. Initial

analysis was repeated using daily data to confirm that this altered neither the patterns of participation nor the strength of the relationships between waves.

7. This option was permissible because the data revealed no clear longitudinal trend and no statistically significant inter-wave difference for any of the key activities considered. The danger that this approach could mask changes in individual circumstances between the waves was negated by the fact that few participants' circumstances (relative to the key variables) changed. Where they did, the longitudinal analysis revealed that this had little effect upon activity participation. Whilst participants who did not participate in all three waves may be considered to have less accurate estimates of their time use, because fewer weeks are included in the analysis of their behaviour, analysis of means suggests that there is neither substantial nor significant difference in the means for different combinations of waves, which gives confidence in the inclusion of all participants in the study, despite their differing levels of participation. Full details are in Kenyon (2006a).
8. The literature review and an earlier qualitative study (Kenyon et al., 2003) highlighted a number of variables, which were seen to influence the primary research question (the impacts of Internet use for personal travel and mobility-related exclusion); namely, income, Internet experience, mode of travel and residential location. A mix of age, educational attainment, employment profiles, gender and household structure was also sought, with a target of 96 participants, providing a good representation of key variables and a sample size manageable within (financial and personnel) resource constraints.
9. The full survey is available at: http://www.transport.uwe.ac.uk/research/projects/internet/survey-wave2-questions.pdf.
10. The questionnaire was designed by Susan Kenyon and Glenn Lyons at the University of the West of England, Bristol. Fieldwork, but not analysis, was conducted by GfK NOP, using their proprietary online panel of nearly 200,000 members in the UK.
11. Note the treatment of missing data. On occasion, the number of minutes spent in secondary activities is missing. We cannot assume how many minutes have been spent in these activities. Therefore, the analysis does not include activities that are recorded with missing minutes.
12. Calculated as all time in which the primary activity was not sleeping.

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