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LOOKING INTO THE BLACK BOX OF EMPLOYMENT: The 'Intensive Hour' Approach To Time Spent In Employment-Related Activities

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Abstract

This working paper describes a new software application for smartphones, designed to gather time-use data about the working day. Called random time sampling (RTS), the software was developed to overcome a void in the standard time-use survey data: namely, the lack of detail about activities undertaken and their social context during paid employment. The RTS system addresses the twin problems of (1) respondent burden, and (2) respondents providing potentially damaging information. Compared to a conventional time-diary which asks for an exhaustive recall of activities over 24 hours, the RTS only samples one hour of employment time per notification, with typically only a few notifications per working day, over a maximum of a few weeks. After becoming familiar with what is required, most respondents spend less than 90 seconds on each notification. Respondents are protected against 'self-incrimination' because the sampling aims to represent patterns typical of an occupation not of an individual. RTS collects insufficient information from any one individual to provide a useable measure of individual performance. The RTS system can be customised. It can be used the study the length of the (paid) workweek, the allocation of time to (99-999) subtasks, the timing of the tasks (by season, by day of the week and time of day), the social context and location of these activities, and the self-rated experience of doing these employment-related activities. Data from pilot studies, undertaken so far, illustrates how this done.

Working time became important as a result of the distinctive change in the character of labour following the industrial revolution. Before this change, the majority of people in Europe worked the land. A smaller number of people, based in towns and cities, were occupied in crafts, controlled by guilds. As E.P. Thompson pointed out, before industrialisation, work organisation was transparently 'task oriented', not organized into blocks of time. Work patterns were organized around the seasons in agriculture (sowing, lambing, harvesting, etc.), in fishing communities by the tides, among metal-working crafts by the heat of the furnaces. The other great marker of time was the calendar of religions festivals – almost one-third of the year was designated saint's days (Hill, 1968: 148).
Following the 'enclosures' (privatisation) of the common lands, the proportion of the population able to make a living by working the land was drastically reduced. This released a large class of people with no other means of livelihood than the sale of their ability to labour. They sold this capacity in units of time. Consequently, the majority of the population began to organize their lives by clock-time, and clocks, along with personal time pieces, proliferated at a rapid rate (Thompson 1967).

The profound set of changes in the organisation of work brought about by the industrial revolution is usually discussed in terms of three stages: (1) the putting-out system of cottage industry; (2) manufacturing; and, finally, (3) modern industry. This sequence is characterized by the employer's drive to maximize output per unit of time (Bittman 2016). The difficulty of securing the cooperation of independent crafts-people working with their own tools in their own dwellings, led to the formation of centralised workshops (factories), and thence to a more thorough division of labour and ultimately the mechanization of many tasks. The process of intensifying the utilization of labour time unexpectedly strengthened, once hours of employment began to be regulated.

It might be expected that this would lead to an interest in the detail of how 'working-time' (the popular expression for time spent in paid, employment-related activities) was used, and resulted in a significant proportion of official statistical collections devoted to micro-scrutiny of working hours. However, this is not the case. Most national statistical offices collect 'Labour Force Surveys' asking respondents to estimate their hours of total income-producing work either in 'the last week' or in a 'usual week'. This is still the usual practice, despite evidence showing that the numbers collected in this manner are unreliable even in regard to length of the workweek, much less providing information about the timing (day of the week, time of day) of the activities undertaken and about the nature of those activities (Robinson and Gershuny 1994: Robinson and Bostrum 1994; Niemi 1993; Pallie 1994).

There was, of course, a highly-developed system of micro-measurement of working time developed under the auspices of the 'Scientific Management' popularised by F.W. Taylor and his one-time-associate and self-nominated successors, Frank B. and Lillian Gilbreth. Originally developed for machinists manufacturing metal components, it developed into a generalized system that the Gilbreths called 'time-and-motion' studies.[i] It was important to show that the process of monitoring employees' time was itself 'efficient' (meaning it took very little time away from paid work-related activities. The apogee of this trend is illustrated in Figure 1 below, which bears the Gilbreths' distinctive touch, measuring time use in 1/10,000th of a minute. In more conventional terms, the total time taken for registering the beginning of your working-time and replacing the time-stamped card was between 6 and 7 seconds.

Figure 1: Time taken to measure time at work

Punch Time Clock

Identify card	.0156
Get from rack	.0246
Insert in clock	.0222
Remove from clock	.0138
Identify position	.0126
Put card in rack	.0270
	.1158

Source; Braverman, Harry.1974. *Labor and Monopoly Capitalism*. New York: Monthly Review Press, P.223

Time diaries and the failure to measure the detail of paid work tasks

The uses to which the results of 'scientific management' were put may explain why official time-use surveys, based on having a respondent record their activities in a 24-hour time diary, discouraged the recording of any details about paid work. Scientific management aroused widespread resistance. Its techniques of breaking-down tasks into routine, low-skill operations made jobs repetitive and boring. Using a system of instruction cards and paper dockets, scientific management wrested control of the labour process away from skilled craft labour and transferred it to the 'planning department'. While it promised management much lower costs, workers resented the loss of control over jobs and over the pace of work, and of opportunities to apply skills autonomously. As it happened, management frequently agreed with workers that the methods were odious. If anything, foremen, superintendents and managers were even less cooperative than workers, since this system of organization usurped their prerogatives as 'overseers' and threatened their job security. Nor were owners generally more accommodating, cancelling contracts with scientific management consultants more often than actually implementing their recommended changes. Ultimately, following a strike at the Watertown Arsenal in 1911, a U.S. Congressional Committee prohibited the use of scientific management methods in government establishments. Later the House of Representatives went so far as banning the use of stopwatches in factories (Bittman 2016: 523-525). The memory of these labour struggles remains strong, even today, and the appearance of anything resembling a stopwatch in the workplace arouses great suspicion. Consequently, national statistical offices may have considered it imprudent to ask for detail about the nature and timing of activities done in the workplace.

All survey research depends for its accuracy on gaining the cooperation of respondents. In addition to mistrust about the objectives of a survey, another significant barrier to cooperation is respondent burden. A complicated and lengthy task is likely to deter respondents from participating and makes it very difficult, even for the willing, to provide accurate answers. Accurate recording of activities that take place in the workplace, including simultaneous activities (e.g. answering the phone while completing a written document) may involve many short duration activities and fast switching

between tasks, as one urgent, high-priority task interrupts another. Asking for detailed recording may, in and of itself, be extremely challenging and threaten the capacity and willingness of respondents to cooperate. Respondents to official time-use surveys are in any case faced with the 'daunting' prospect of accounting for all activities in 24-hour periods. Perhaps recalling complicated or fast sequence of events at work is so demanding that respondents simply abandon the task, or collecting information on time during 'working hours' devoted to non-work activities is threatening request.

Whatever the reason, the net result is that official time-use surveys actually instruct respondents to provide minimal information about time allocated to paid work. This last statement requires some brief explanation of how the time-diaries of most national statistical offices are collected.

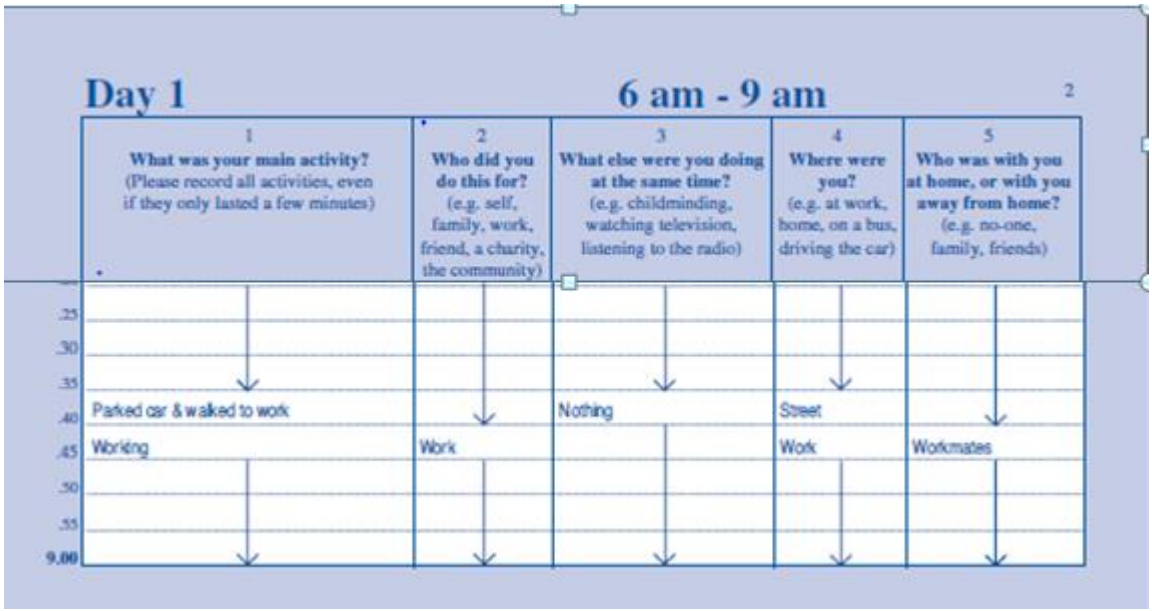
Most diaries have been collected using a 'paper and pencil' self-complete format. The time-diary is set out in columns. The first column shows the hour of the day divided into a specific number of intervals, where respondents record the start and finish time of an activity episode. In the first column (headed 'main activity'), there is space for the respondent to write a description of what they nominate as their main activity (in their own words). In another column (headed 'were you doing anything at the same time?') respondents can record any accompanying, simultaneous activity. Further columns gather information about the social context and location of these events. Context information usually includes company present during this event and where the activity took place. Sometimes there is a context column to gather information about 'for whom' this activity was done. In recent times, respondents have been asked to record any ICT devices they used while performing this activity. Often context columns offer pre-coded responses. Alternatives to paper-and-pencil time-diaries (which have been used in Australia, Eurostat countries, and North Asia) include diaries completed by computer-assisted telephone interview (used in Canada and the USA), face-to-face interviews and recording by observers (in many developing and transitional economies). However, the information obtained by each of these methods of data collection is standardized.

In the case of self-completed time-diaries, the established practice is to include a (mock) example page of the time-diary. This is an essential and influential part of the instructions given to respondents. Experience shows that, when activities are displayed on the example page, there is an increased the likelihood that these activities will be reported, especially in cases when such activities are easily overlooked. A clear illustration, that occurs on the Australian example page, is the inclusion of 'child-minding' as a simultaneous activity happening in the background while another task is reported as 'main' activity. Many Eurostat guidelines for the example page do not include this[ii] This inclusion of 'child minding' as a (secondary) simultaneous activity produces an average time of 72 minutes per day devoted to secondary child care by the whole adult population in Australia (with and without dependent children). The average in the 15 European countries following the standard Eurostat guidelines ranges only from 1 minute per day to 17 minutes per day.

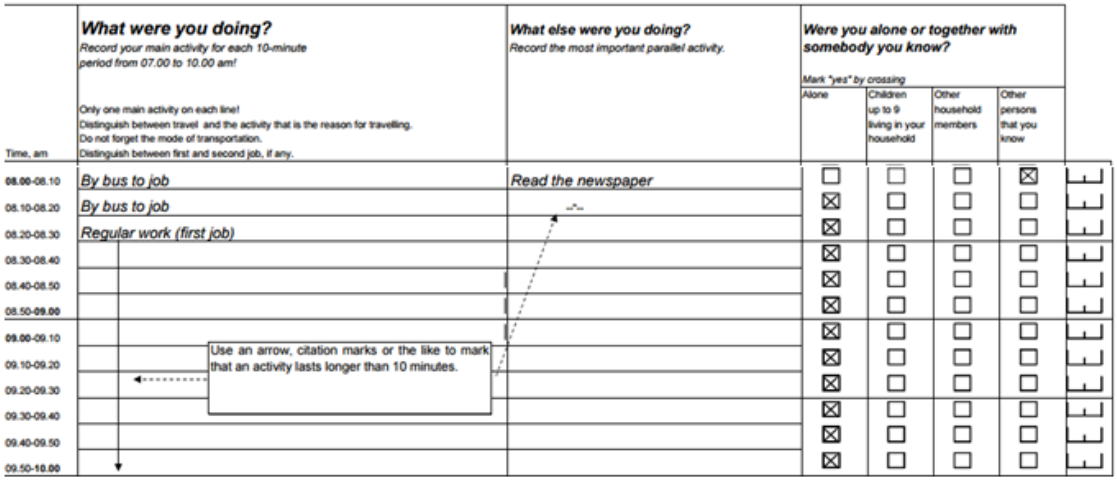
In relation to the activity of paid work, the Australian example page (Figure 2, Panel A below) encourages respondents to simply say their main activity was 'working' (column 1), that they weren't doing any other activity at the same time (write 'nothing' in the column 3), that the social context of this activity was the presence of work colleagues (column 5), that the location where the activity took place was at 'work' (column 4), and they were doing this activity for 'work' (column 2). Eurostat standard, the mostly widely used harmonization guidelines in OECD countries, differs from the Australian example only by suggesting (paid) work is done 'alone' (Figure 2, Panel B, below). Official

data gathered via telephone interviews follow a similar pattern, neglecting to probe deeper about the kinds of activities done at the place of employment.

Figure 2 Detail of mock example instructions,
Panel A: Australian Bureau of Statistics 2006



Panel B: Eurostat, Adult Diary2004



This conventional method of eliciting information about employment-related activities generally succeeds in gathering accurate start and finish times for paid work, as well as some information about 'breaks at work'. But it collects minimal information about the nature, duration and timing of the tasks undertaken in the course of a working day.

A way around obstacles: Combining random time sampling (RTS) with the 'Intensive Hour' administered by smartphone

The first task in devising a method of collecting more detail about paid work activity is ensuring cooperation by drastically reducing the burden of reporting placed on respondents. The second obstacle to overcome is to protect individuals from the possibility that the data they provide might be used against them, i.e. they should be confident that they cannot inadvertently 'self-incriminate'.

The method of study described here uses a technique known as 'random time sampling', perhaps better known by the name of its most famous application, 'Experience Sampling Method' (ESM). Random time sampling relies on the same reasoning that underlies all samples – if you get a large enough probability[iii] sample of a sub-population's activities by time of day, then you can build a representative picture of the average time per day that sub-population spends in various activities, when they do each activity and for how long. This technique is not new, it has been around since the early 1980s and there much methodological testing of its reliability (Larson and Csikszentmihalyi 1983; Robinson 1985; Wheeler and Reis 1991; Bolger, Davis and Rafaeli 2003; Kahneman et al. 2004)

Conventionally, ESM has been used to capture subjects' fleeting states of attention/arousal, concentration and affect (emotions) at the precise moment they receive a random time signal (Csikszentmihalyi and Larson 1987:527). The method described here combines the a drastic reduction of the recall task with Thomas F. Juster's idea of the 'intensive hour'. This is the name Juster gave to the concept John P. Robinson called the 'random hour' (Robinson and Godbey 1997: 76). The intensive hour, was part of experiments testing the relationship between the duration of recall and the quality of the data (Juster, 1986). It has two useful advantages in this context: (1) it places a much smaller burden on respondents than conventional 24-hour time-diary instruments, since they have to recall only short time periods (what happened in the last hour in our case); and (2) its one-hour samples (as opposed to momentary samples) quickly accumulate to achieve a size sufficiently large to enable an analysis of detailed time-allocation sub-tasks, along with the rhythm and timing of these activities.

Perhaps the most important advantage, however, is that a well-devised sampling protocol can be used to protect respondents' confidentiality. If only a small number of observations are taken from each individual, the information is insufficient to judge individual performance, but the results yield a very accurate picture of 'composite', 'average' or 'typical' individuals in that occupation. The system can be designed to protect the interests of respondents, since they do not divulge information that could result in self-incrimination, but it still yields the most detailed picture of the activities that constitute a particular occupation.

From the field operations point of view, collecting pre-coded data using smartphones not only simplifies response burden, it also automates data processing. Lowering the response burden improves both response rates and the quality of the data. Automated processing permits rapid and cheap analysis.

Explanation of data collection

Gathering activity information – response sequence

What follows is a walk-through of the process of responding to this survey. The research participant loads the software on their own smartphone where possible (one version for Apple's iOS platform, another version for Android platforms). For those without a suitable smartphone, a small number of 'loan' phones are rotated for the period of the respondent's participation in the study, in order to allow everyone in the target population to participate.

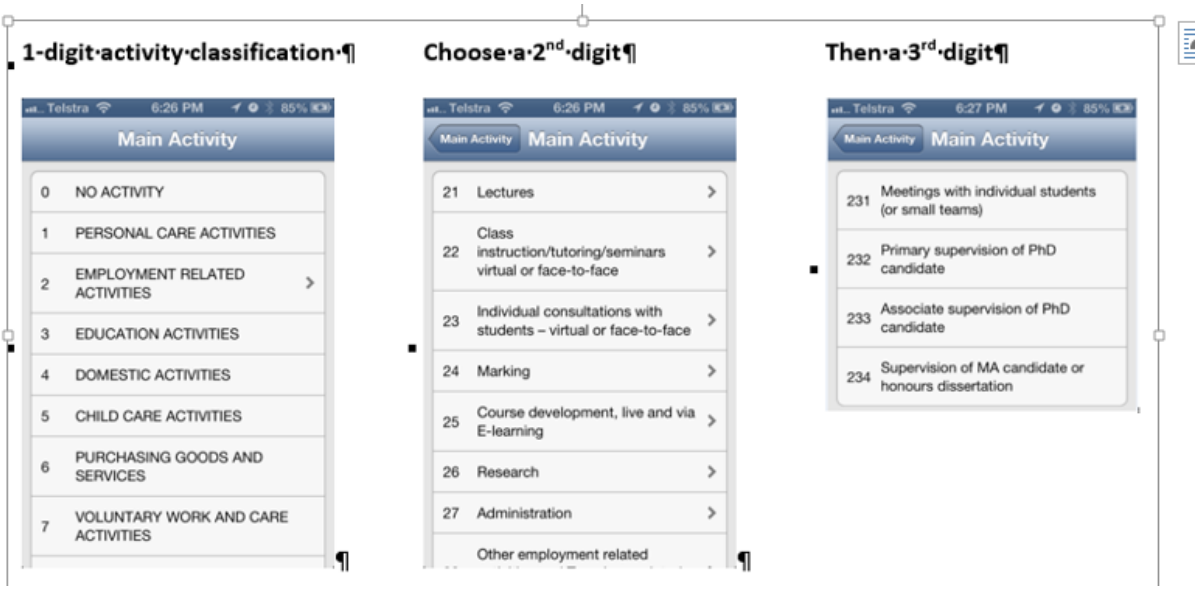
Each participant receives three notifications a day for a set number of days (typically 2-3 weeks). If the respondent is not in position to respond at the moment of notification (e.g. they are in the midst of presentation or wish to sleep), the program generates a replacement notification which is added to the end of its list for that user.

Many occupations have periods of peak activity and relative lulls and, for the whole occupational population under study, notifications are therefore spread to capture this seasonal rhythm. This 'seasonality' influences the required sample size, since there should be sufficient observations at various point of the cycle to yield robust estimates. However, this can be achieved without very large sample sizes.

Some occupations have strictly fixed start and end times, while others accord workers a great deal of autonomy over when they work. Consequently, there are two version of the software—one for fixed hours of work (where there is no interest in time devoted to non-work activities), and a second version which collects information on all 10 of the major groups of activities (based on the ABS Time Use Activity classification), but asks for extra detail only about 'employment-related' activities.

The first time a notification is received the respondent gets a screen with a welcome message, inviting them to begin recording the activity they have been undertaking in the 60 minutes leading up to the notification. In the version for non-fixed working hours, the respondent is first offered the 10 major activity groups – '0 No activity', '1 Personal care activities', '2 Employment-related activities', '3 Education activities', '4 Domestic activities', '5 Child care activities', '6 Purchasing goods and services', '7 Voluntary work and care activities', '8 Social and community interaction' and '9 Recreation and leisure'. If the response indicates that the respondent was engaged in '2 Employment-related activity', they are presented with a set of 10 choices specifically related to employment (at the 2-digit classification level). In the pilot study of academics in a Humanities and Social Sciences department, those choices were '21 Lectures', '22 Class instruction/tutoring/seminars face-to-face', '23 Individual consultations with students', '24 Marking', '25 Course development', '26 Research', '27 Administration', '28 Other employment-related activities', '29 Associated travel/waiting'. Having nominated a 2-digit category of employment-related activity, the respondent is presented with another screen (at the 3-digit classification level) prompting them to specify the activity more precisely. If, for example, the respondent indicated they were engaged in '23 Individual consultations with students', the next screen would prompt them to indicate whether this was or '231 Meetings with individual students (or small teams)', '232 Primary supervision of PhD candidate', '233 Associate supervision of PhD candidate', '234 Supervision of MA candidate or honours dissertation'. The sequence of screens for this group of academics is illustrated in Figure 3, below.

Figure 3 Screen sequence for gathering up to 100 subtasks in an occupation with undefined hours of work (example from pilot study of Humanities/Social Sciences academics[iv])



There are distinct advantages to using the unknown working-hours version, which collects all activities during the respondents' waking hours, because what we have learnt from many decades of analysing 24-hour time diaries has established benchmarks. We know, for example, the average time an adult spends in leisure activities such as watching television, in socializing with family, friends and neighbours, in participating in voluntary organisations, and in eating, sleeping and grooming. So it is easy to see which times are above and below average. This in turn can be a useful, if crude, measure of time scarcity, colloquially called 'time squeeze'. Segments of the population who are very time squeezed typically deprive themselves of the time allocated to personal care (sleeping, grooming) and leisure (especially television viewing).

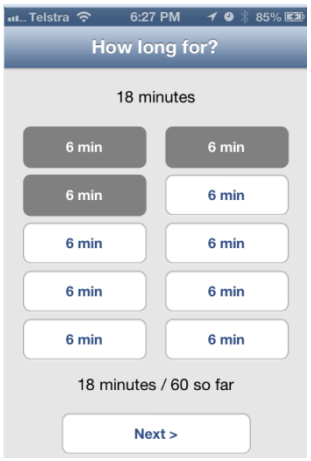
In the case of fixed working hours, it is theoretically possible to record up to one thousand distinct subtasks. However, in practice, when the software has been modified for the study of a particular occupation, as in the case of the pilot study of early-childhood educators/carers and child-protection case managers, the end-users have been satisfied with the detail provided by the 2-digit activity classification (i.e. with a maximum of 100 subtasks).

Recording the duration of an activity

Respondents are asked to record the time spent in any activity to the nearest 6 minutes; 10 icons of six minutes fit comfortably on a smartphone screen. Some paper-and-pencil diaries have a small number of 'open' or unlabelled intervals within the hour, but the worldwide standard is to have 'fixed' or labelled intervals within the hour. This is shown in Figure 2, where the European-wide standard divides the hours into six intervals of 10 minutes length, while the Australian Bureau of Statistics, with globally rare precision, divides each hour into twelve five-minute intervals. Since most of the existing time-use data is collected 'to the nearest 10 minutes' (or even less often), six-minute intervals are an internationally acceptable level of precision.

Figure 4 Recording the duration of activities.

Time spent in 6 minutes intervals



Multi-tasking

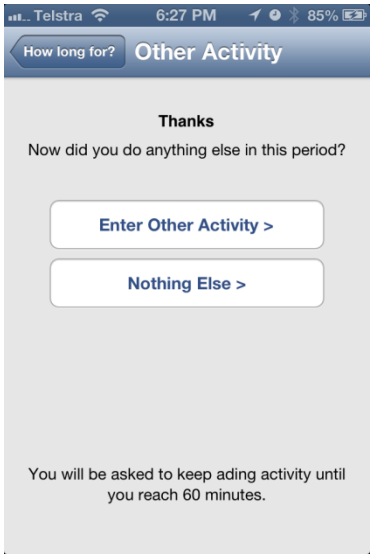
More than half a century of experimentation has shown that people not only do activities simultaneously, but that they can recall them too. Most national statistical offices believe that respondents can provide information about at least one secondary activity performed simultaneously with a main activity. There are some activities, notably listening to the radio (and, as previously mentioned, 'child minding'), that respondents typically record as a 'background' activity performed at the same time as being engaged in a different main activity, e.g. listening to the radio while eating breakfast or driving to various destinations or engaging in hobbies or housework. Moreover, while listening to radio is rarely recorded as a primary activity, the total quantity of time when the radio is playing in the background rivals the time devoted to viewing television as a main activity.

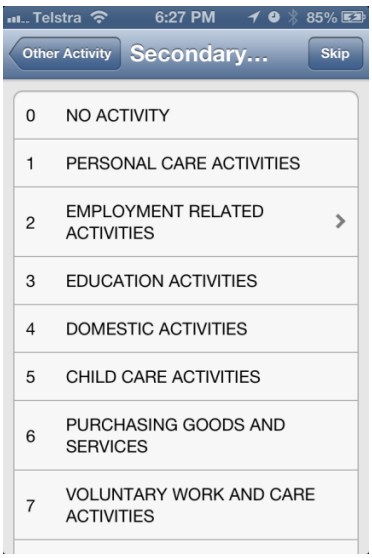
There is some disagreement among academic disciplines about so-called 'multitasking' . Experimental psychologists interested in 'divided attention' see it as fast switching between single activities, while economists are inclined to think that trying to do two things at once (or even switch rapidly tasks) comes at a cost. They believe that switching between distinct neural pathways reduces the rate of productivity in the performance of all the tasks being performed.[v]

The RTS software described in this Working Paper follows the established practice of asking respondents after they have completed the process of describing the 'main activity' in detail, whether they did some other activity at the same time. See Figure 5, below.

Figure 5 Gathering a second, simultaneous activity

Doing anything else at this time?





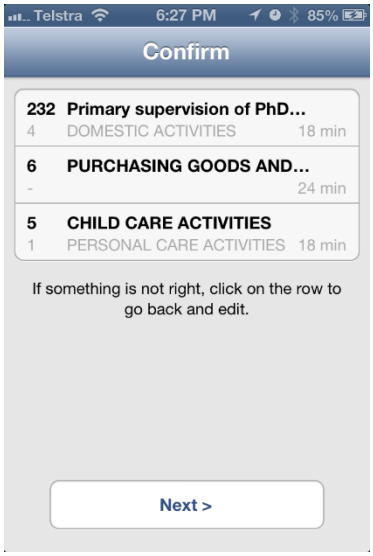
I argue that the division of labour resulting in detailed specialisation is not characteristic of all productive activities (Bittman, 1990). Adam Smith's famous illustration of how the apparently simple process of manufacturing pins is divided into 18 separate operations each performed by a specialist, was extended by 'scientific management' studies and then elaborated further by Henry Ford's refinement of the assembly line. However, non-market production often seems to rely upon the activities of a single operative, and the most obvious way of increasing the productivity of the single operative is to engage in more than one activity, thereby utilizing 'dead time' by switching to the performance of a second or third task. A significant proportion of leisure activity also involves another activity, e.g. combining it with child care, or even engaging in more than one leisure activity at once (e.g. texting a friend while watching television) (Bittman and Wajcman 2000). Mobile information and communication technologies promote the sense of 'perpetual contact' and elicit frequent switching of activities, hence the development of etiquette about when these devices should be switched-off (Bittman et al 2009). For these reasons, gathering what respondents are capable of telling us about simultaneous activities is a worthwhile feature of the program.

Confirmation screen – summary of your responses and opportunity to correct errors

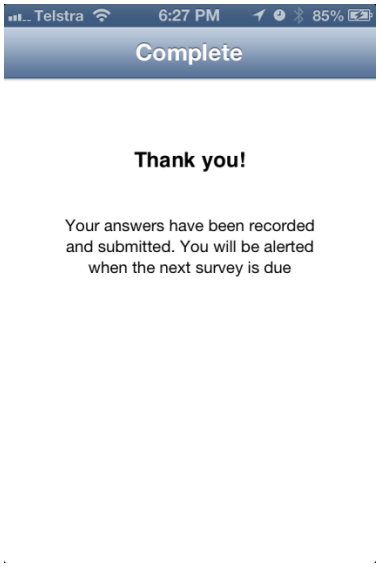
Once the last 60 minutes of activity have been recorded, the respondent is shown a confirmation screen (see Figure 6, below), which summarizes the sequence of main activities (shown in black), simultaneous activities (shown in grey), along with their durations in the last hour. There is an opportunity for respondents to spot errors and correct mistakes. Following this they receive a screen thanking them. The respondent is notified again at the next randomly-chosen moment.

Figure 6 Confirmation screen (opportunity to edit recorded response) and Thank You screen

Confirmation screen



When all is done– well-earned thanks



Demonstration of utility of data – a pilot study of 1,000 hours.

The RTS system has been piloted in a variety of occupational contexts since 2012. The first study began with an approach by a Humanities/Social Science (HASS) department in a 'sandstone' university, where staff were concerned to investigate their actual workload (as distinct from those shown in the spreadsheets used to allocate workloads).[vi] The following year a network of researchers studying the work of early childhood educators/carers used the RTS system in an appropriately customized version. In 2015/16 the Victorian Department of Health and Human Services did a small-scale study of child-protection officers' supervised contact and transport. Each user of the system had slightly different reasons for gathering the data, and each of the occupations in these pilot studies had distinct characteristics. The most challenging application was that involving the HASS academics because of the large number of variations in the timing of work. For that reason, I will illustrate the analytic yield of the RTS system by mostly discussing this occupation and what it reveals about time-use.

There were a number of challenges specific to this occupation. As noted earlier, HASS academics have considerable autonomy over when they work. At the same time, the academic year has an annual rhythm set by the teaching calendar and research-related closing dates, e.g. competitive grant applications or report and publication deadlines, and this produces distinct peaks and troughs in the intensity of job demands.

Dealing with no fixed hours of work

Dealing with the unregulated nature of the academic workday required specific arrangements. Pre-testing showed that employment-related activities spilled-over beyond any notion of 'office hours'. Consequently, it was impossible to assume that HASS academics even had regular times during which they slept and did not work. It is for this reason that the RTS program for non-fixed work times chose randomly from all 24 hours of the day, seven days a week, although respondents were instructed to put their phone out of earshot when they wished to sleep. If the respondent was asleep when a

notification arrived, the software scheduled another randomly-selected time for a replacement notification and added it to the end of its notifications list. As well, academics might or might not be doing employment-related tasks while awake, hence the no-fixed-hours version of the RTS, mentioned earlier, which collects all 10 major activity groups, but only asks for extra detail about 'employment related' activities.

Seasonality: capturing peak demand, lulls and vacations

Another aspect included in the software program is seasonal rhythm. Because random time sampling is designed to protect the confidentiality and anonymity of respondents and reduce respondent burden, it uses only a small sample of each individual's time. This means that the analysis is robust only when all the information in the sample is used. We get a picture of typical patterns of time-use in that occupation by using the information provided by all the respondents. This typical pattern is, in effect, the pattern of a composite individual. By staggering the beginning dates of each individual's notification series, we can capture the whole cycle of seasonal rhythm. We can also get workload averages across peak demands, lulls and vacation time. In the HASS academic pilot, the particular university under study divided the year into two semesters, so it was possible to capture seasonality with a sample that ran from October 2012 to June 2013, which included final exams, course preparation, competitive grant deadlines, etc. The correct proportion of each day in the Semester cycle was estimated with the use of statistical weights. Each of the 20 potential respondents was asked (where possible) to respond to three notifications a day for the equivalent of 21 days, with start dates staggered. This would have potentially yielded 1,260 sample hours across 273 days of the year, although non-response meant that total sample size was just short of 1,000 hours.

Calculating the length of the workweek

Where there are fixed working hours, and employees strictly adhere to this regulation, the length of the workweek is known. However, a large proportion of the workforce are salaried workers or subcontractors. Under this system of organization, employees must complete a task by a nominated deadline, rather than leaving at the end of the working day whether or not the task is finished. This may explain the high level of 'unpaid overtime' reported in surveys (Aronsson, 1999; Bell et al., 2000; Campbell, 2002b). In these circumstances, the no-fixed-hours version of RTS is the more appropriate one to use.

Amongst the HASS academics, the actual length of the workweek is unknown. Often, as we will see, employees themselves are unsure about how many hours they work. Certainly, start and finish times of employment-related activities are very irregular. In some cases the calculations in the universities' official workload spreadsheets used to distribute workloads 'equitably', reverse the research procedure. Instead of using the research to 'discover' an unknown quantity of hours the procedure assumes a given total number of weekly work hours, then divide up this fictional total into portions of working time allocated to each activity. Frequently these fictional totals are derived from the regulated hours of civil servants in past times, and the function of the workload allocation is to make it appear both 'reasonable' and 'regulated'.

So what does the RTS pilot data suggest is an average workweek among HASS academics? This workforce actually averages about 53 hours per week.[vii] These are indubitably long average hours of work. The International Labour Organization (ILO) defines long hours of work as 'those exceeding 48

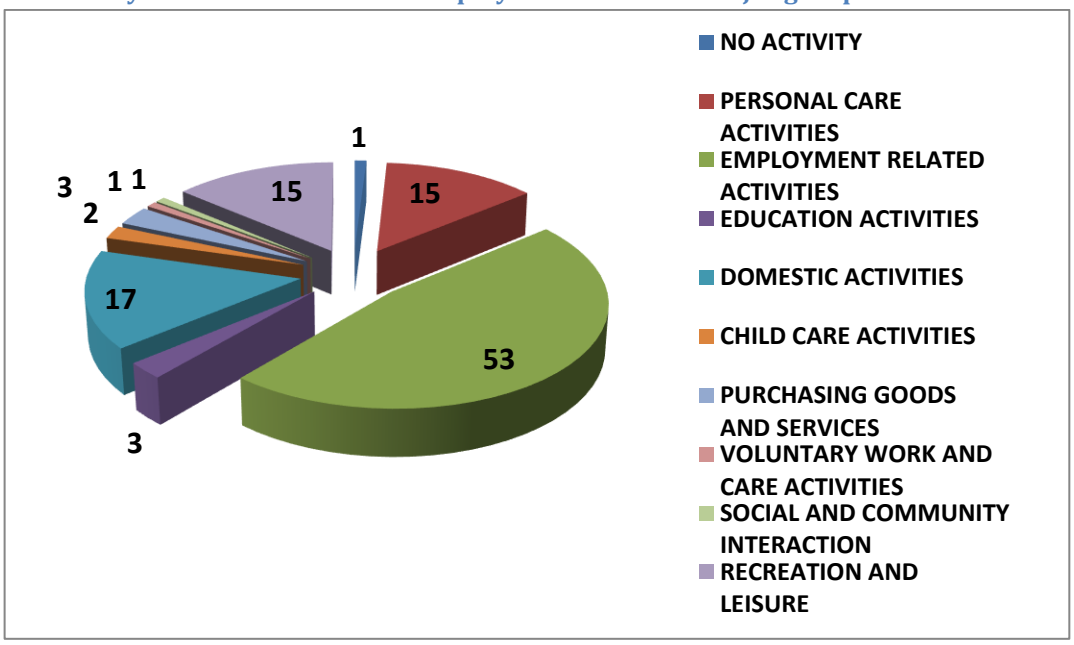
hours per week, in line with Conventions Nos. 1 and 30 (Messenger and Ray 2013:1). The proportion of Australian employees overall who work long hours is the highest among Western advanced economies.[viii] The Australian Bureau of Statistics' latest national Time Use Survey (2006) estimated the average time spent in employment-related activities per week as 39.9 hours among full-time employed females and 48.88-hours among full-time employed males.

The other information gathered in the HASS pilot study confirms the impression of a group of employees suffering time-squeeze. The average time devoted to Personal Care and Leisure and Recreation is reminiscent of the time spent on these activities by the mothers of young children, who deny themselves time for personal care and leisure in order to make time for their children (Craig 2007). Academics' personal care time (not including sleep, i.e. mostly time spent eating, bathing and grooming) at 16 hours per week is less than the Australian Bureau of Statistics' average for Australians overall: 16.33 hours per week for males in full-time employment, and 18.43 hours per week for females. Similarly, leisure and recreation at 15 hours per week is well below the Australian Bureau of Statistics' average for full-time employed people overall, ranging from 20.65 hours per week for females to 24.03 hours per week for males.

Surprisingly, the second largest allocation of HASS academics' waking time goes to domestic work (17 hours per week). This is above the ABS average for full-time employed persons, at 14.23 hours per week for females and 8.87 hours for males. It may be that working from home explains this increased propensity toward keeping house.

The sum of the time allocated to all of the other six major activity groups accounts for mere 12 hours per week. Each of the six taken singly accounts for between one and three hours of weekly waking time (see Figure 7, below).

Figure 7: Weekly allocation of hours to employment and other major groups of activities.



The 2011 Work and Careers in Australian Universities (WCAU) Survey of university staff, included 8,391 continuing or contracted academics in 19 of the 37 Australian universities. Easily the biggest and most comprehensive survey of working conditions in Australian universities,[ix] it found that the majority of the women (56%) and 48% of the men would prefer to work fewer hours than they

currently do, while only a very small proportion (3% of men and 5% of women) would like to work more hours (Strachan et al, 2012: 36).

2-digit categorisation of work tasks

Australian universities often use three categories of activity as a shorthand for the duties of academics – teaching, research and administration (sometimes called 'service to the university'). Each should supposedly occupy one-third of an employee's time. However, the WCAU Survey revealed that academics preferred the workload to be 29% devoted to teaching, 51% allocated to research and 19% assigned to administration/service (Strachan et al, 2012: 36). Furthermore, the same study found that, while the majority were happy with current allocation of time to teaching (54% of both sexes), almost one-third wanted to devote less time to this task. Roughly two-thirds wanted more research time, and a similar proportion wanted to devote less time to administration (Strachan et al, 2012: 37).

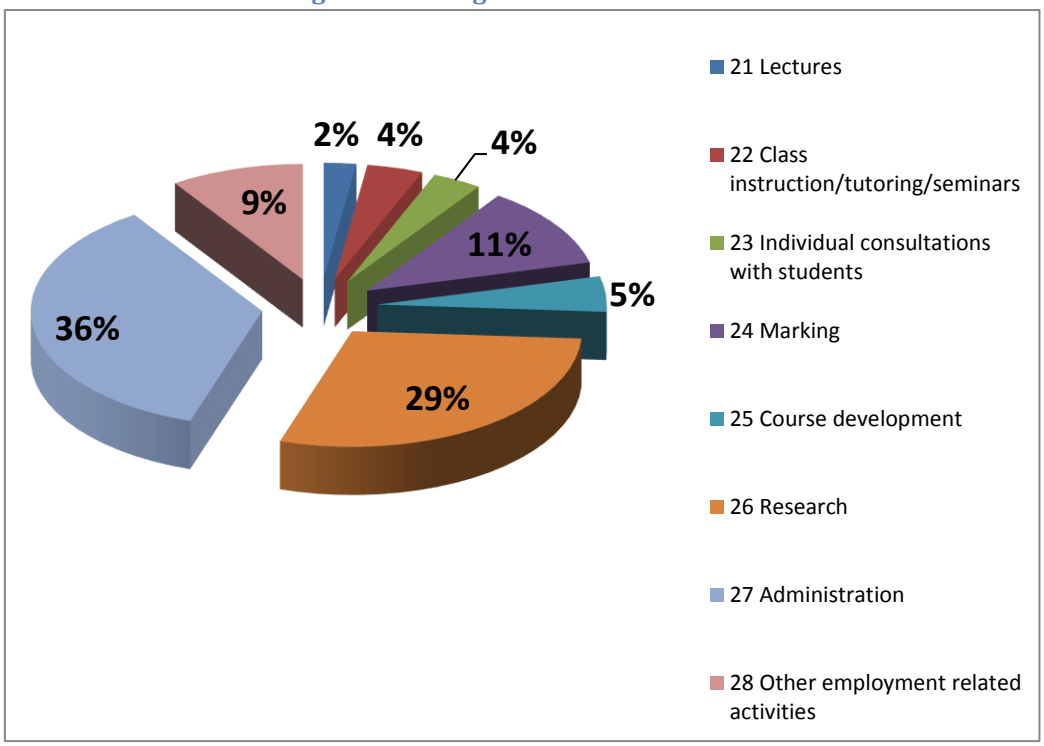
The next level of disaggregated analysis permitted by the RTS system shows how time is in fact allocated between these broad categories of duties. A detailed breakdown of the typical distribution of working time between tasks at the 2-digit level is shown in Figure 8, below.

Figure 8 shows clearly that the largest slice of the time pie is devoted to administrative tasks. The next largest slice is devoted to research, although it must be borne in mind that this proportion would be inflated by the inclusion of 'research-only' staff. Curiously, teaching activities (lectures, class instruction, student consultations, marking and coursework), which most parents and students think of the 'core business' of universities, occupies only slightly above a quarter (26%) of (non-casual) academic staff time. More insight into this apparently low proportion will emerge when the 3-digit activity classification is explored, later in this article.

Given the current trend to purvey Australian university study as a 'consumer good', this low priority accorded to teaching seems puzzling. However, it becomes more comprehensible in the light of what counts in international university rankings. Australian universities are striving to climb the world-wide rankings ladder, and a high position on the ladder is heavily influenced by a university's collective research outputs.[x] Presumably, this striving for a higher ranking is based on the financial importance of overseas, full-fee-paying students, along with the belief that the parents'/students' decision is a 'brand' choice, and not a decision based on sound information about the quality of teaching.[xi]

A disturbingly high proportion (9%) of the working-time pie falls into the 'other' category. These activities are missed by most official workload spreadsheets. Many of the activities falling into this category are undertaken to demonstrate the portability of reputation. A former colleague once described it as 'sitting on packed suitcases', e.g. scouting for possible appointments or fellowships at other institutions in Australia or overseas, updating the Curriculum Vitae, maintaining the necessary professional networks, etc.

Figure 8: Allocation of working time at 2-digit level



Comparison of broad (2-digit) allocation of employment-related time with 'expected' allocation

If the appropriate data is collected (in this case in a separate WCAU survey described earlier), the actual average allocation of time to broad groups of occupational tasks, as measured by random time sampling, can be compared to the expected allocations. The relevant expected allocations are of two kinds: (1) normative targets promoted by management, and (2) participants' own views about how their time ought to be allocated. In the case of academics, the management normative rule of thumb is that employees have three tasks – teaching, research and administration – and are expected to divide their time equally between these categories.

The pilot study shows that almost a third of the time devoted to employment-related activities was devoted to research (29%), slightly over a quarter (26%) was devoted to teaching, while the largest slice of the time pie (36%) was devoted to administrative tasks. In other words, the time cost of administration comes at the expense of teaching and, to a lesser extent, of research (although the research component is inflated by the inclusion of research-only academics who do not teach). The organizational 'improvements' brought about by shifting administration from paid ancillary staff to online, self-service by academic staff, has unbalanced the proportional allocations set by management with a heavy absorption of working time in administrative tasks. This has meant a corresponding reduction in the proportion of time devoted to the 'core' tasks of research and teaching.

Employees working in this occupation, however, tend to view themselves primarily as 'researchers', whose secondary task is 'teaching', with administration a necessary evil to be kept as far as possible to a minimum, as is shown in Figure 9, below.

Figure 9: Employee's preferred allocation of working time (at 2-digit level)

Employee preference for more time devoted to teaching

	Women		Men		Total Sample	
	N	%	N	%	N	%
More	573	15	585	15	1158	15
About the same	2075	54	2027	54	4102	54
Less	1218	32	1171	31	2389	31
Total	3866	100	3783	100	7649	100

Employee preference for more time devoted to research

	Women		Men		Total Sample	
	N	%	N	%	N	%
More	2861	68	2591	65	5452	67
About the same	1178	28	1247	31	2425	30
Less	152	4	161	4	313	4
Total	4191	100	3999	100	8190	100

Employee preference for more time devoted to administration

	Women		Men		Total Sample	
	N	%	N	%	N	%
More	71	2	77	2	148	2
About the same	1325	33	1259	33	2584	33
Less	2675	66	2480	65	5155	65
Total	4071	100	3816	100	7887	100

Source: Strachan, G.et al 2012:37

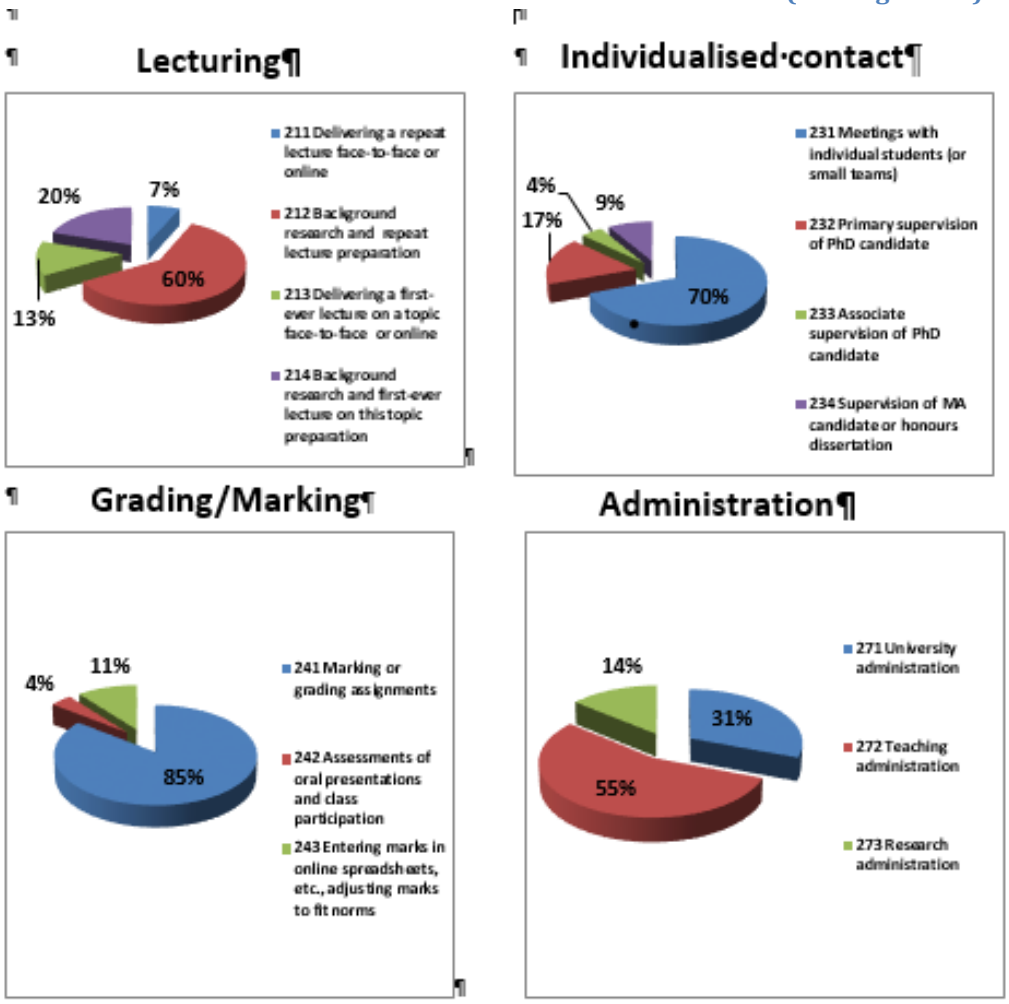
3-digit categorisation of work tasks

The information captured by the RTS enables an even more detailed breakdown of employment-related activities. In Figure 10 are four examples examining the allocation of time using the 3-digit level employment-related activities of our Pilot study of academics. The top left-hand panel of Figure 10 shows that most of the staff time allocated to lecturing (60%) is spent on the preparations required for a repeat/variant of a lecture already delivered. This preparation Includes: background reading on the lecture topic; gathering presentation materials such as pictures, audio or video clips; writing content; and creating PowerPoint presentations that can hold students' attention. The ratio of time spent in preparing the lecture to time spent delivering it is 9:1 (even with familiar material). The much narrower ratio for preparation and delivery for new lectures (roughly 3:2) is puzzling, because 'new' lectures are typically heavily weighted in the universities' workload-allocation spreadsheets. Perhaps the typical original form of new lectures is strongly extemporised, and it is the refining in subsequent iterations that takes up so much time.

Time allocated to personal, contact with individual students or small teams (shown in the top right-hand panel of Figure 10), amounts to 70% of the academics' individualized contact time with undergraduate students. This includes face-to-face or virtual meetings to discuss students' own assignment plans, feedback on marks awarded, helping students with special needs, and monitoring progress or issuing warnings (about attendance or plagiarism). Primary supervision of doctoral students amounts to about 17% of academics' working time. This includes face-to-face, virtual or telephone contact to discuss plans, reading and commenting on drafts, and time spent in suggesting

possible examiners. Other forms of post-graduate supervision (Masters and Honours dissertations) consume the least time (4%).

Figure 10: Illustration of further breakdowns of academic subtasks (at 3-digit level)



As the bottom left-hand panel in Figure 10 shows, 85% of HASS staff time spent in 'grading' (or 'marking' as it is called in the UK and Australia) is spent in reading and marking written assignments, while a mere 4% of the time is allocated to assessing oral presentations and class participation. More than one in ten of the hours devoted to the task of grading goes toward the unpopular sub-task of entering grades/marks online.

The proportion of academic time spent in administration is more than 19 hours per week. Administrative duties associated with teaching (as shown in the bottom right-hand panel of Figure 10), accounted for 55% of the aggregate time the academic workforce devoted to administrative duties. This included course convening, coordination of grades, internship placement, maintaining Blackboard and other instructional websites, appointing casual teaching staff, managing tutors, calculating workloads, booking rooms, keeping rolls, dealing with special considerations, and advising on University regulations. Given that universities award degrees and are therefore certifying institutions, it is no surprise to discover this is an important responsibility for teaching staff. But, as

noted earlier, it is a surprise that the time allocated to it is greater than the time devoted to face-to-face teaching.

The allocation of time to these generally disliked[xii] teaching administrative tasks has been significantly increased by three interrelated processes in recent years. First, against the background of greatly reduced federal funding, universities have cut costs by reducing the number of specialised support staff and devolving to academics many of the tasks formerly performed by these staff. Second, the need to compete internationally for the custom of full-fee-paying students drives universities to strive for higher rankings in the widely-used league tables. Since the metrics behind the league tables are heavily influenced by peer-reviewed research, this has been accompanied by a heavy reliance on casual teaching staff in HASS disciplines and insecurely employed research staff in STEM disciplines, with the aim of freeing up full-time, experienced staff for research, while failing to comprehend this potential for gain research time is eaten-up by newly devolved administrative tasks. In many of the most popular courses (where enrolments exceed 300 students), the majority of persons employed to do face-to-face teaching are not full-time academics but casual staff working 'flexible' low hours, on short-term contracts with no guarantee of future employment. Under these circumstances, full-time staff become managers of a large academic, sessional workforce, with many of the devolved duties of Human Resources Managers. The third process is the introduction of information technology. Possibly to protect their flanks from multinational online offerings (to use a military metaphor), Australian universities have augmented most teaching with the kind of infrastructure that, once upon a time, was characteristic of institutions that specialised in distance education. In the name of 'customer service', most lectures are recorded, all written materials are online, and increasingly assessment (including checks for plagiarism) are conducted via the internet.

The next highest proportion of academic time devoted to administration (31% or almost six hours a week) is 'service to the university'. University administrative roles include departmental chairs, University, Faculty and School officers, of committee membership, preparation for and attendance at Open Day(s), and completing reports on one's own performance and that of other staff.

Fourteen percent of the staff time devoted to administrative duties is spent on research administration. This Includes: ethics approval applications; applying for grants; writing rejoinders; appointing and managing research staff; coordinating research teams; budgeting and organizing pay, travel and other financial aspects; registering for conferences; paying annual dues; submitting publications and associated correspondence; and entering research output in University databases and associated emails. Research administration is subject to some of the influences that have expanded the time allocated to administration in teaching. Acquitting research expenditure, for example, is now typically done online by the researchers themselves rather than by a finance officer. As well, most universities since the last decades of the 20th century must have all research projects involving human subjects (by both staff and students) approved by a specialist standing committee on ethics, on pain of disqualification from national competitive grants e.g. ARC or NHMRC grants. The criteria for approval were designed for medical research (Mitchell 1993) and are often self-evidently inappropriate for behavioral research, including anonymized and confidentialized survey data. It is a bureaucratic and lengthy process, often requiring many re-drafted submissions before finalization, with infrequent and inflexible deadlines that add significantly to the quantity of research-related administration.

Timing of employment activities

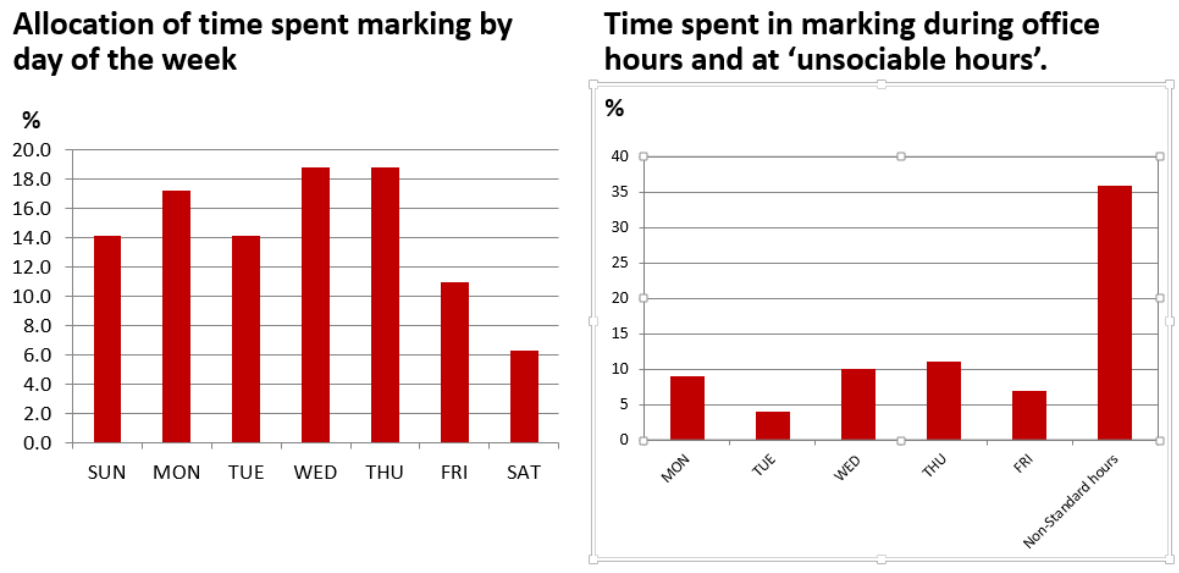
For almost a century, time-use studies have been used to collect information about when activities are undertaken. Timing information concentrates predominantly on the daily rhythms of certain categories of activity and the 'peak' times of day when they occur. But it also takes account of the variations associated with particular days of the week and seasons of the year. This is particularly relevant in the context of working time because autonomy — 'decision latitude' — over the timing of work tasks has been proposed as a significant counterbalance to the pressure of 'job strain' induced by the level of job demands (Karasek, 1979). University academics are an occupational group with comparatively high levels of 'decision latitude' over the timing of many work-related tasks.

A simple work task such as marking (or 'grading') of students' written assignments is a substantial element of the job of an academic in the field of humanities and social sciences. This task does not have to be done immediately and can be 'time-shifted'. The patterns of time devoted to marking by day of week are shown in the left panel of Figure 11, below.

What is immediately apparent is that what is notionally considered a non-working day – Sunday – is frequently chosen to catch-up on grading written assignments. Indeed, more marking is done on a Sunday than on a Friday. After Monday, Wednesday and Thursday, Sunday is the fourth choice of a day for this task. A non-negligible amount of marking takes place on Saturday as well.

This raises another topic which random time sampling data illuminates – unsociable hours. For more than century, working time in advanced economies has, to a greater or lesser extent, been regulated by national governments. There has been an unspoken idea that, by reducing 'unsociable hours' of work, the nation state promotes family synchronization, solidarity and social coordination and harmony. If time spent working before or after office hours and on weekends is assumed to be time spent working relatively unsociable hours, then (as the right panel of Figure 11, below, shows) it is noticeable that HASS academics are likely to use their decision-latitude over the timing of marking to displace this work to unsociable hours of the week.

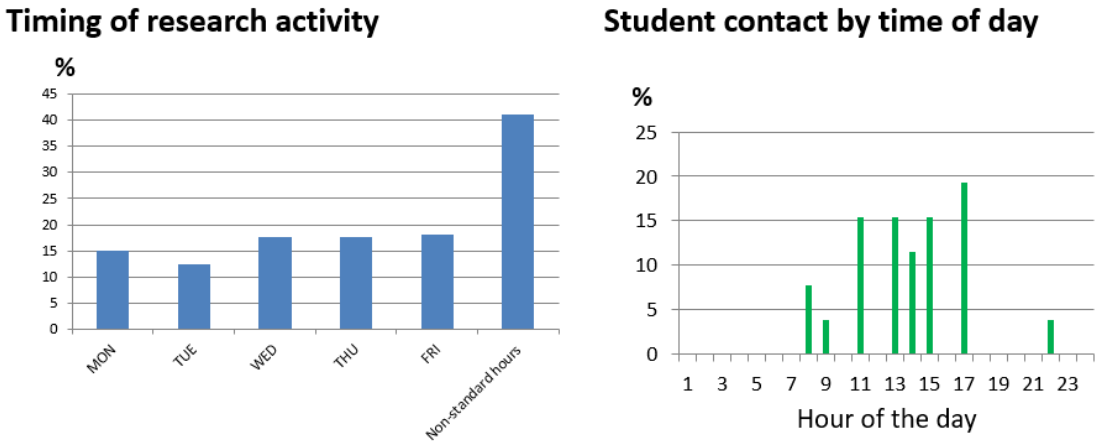
Figure 11: Timing of marking



A very similar pattern appears in the timing of the 'core' activity of academic research. As the left panel of Figure 12 (below) shows, just over 40% of academic research occurs after office hours, on weekends, while the remaining 60% is spread fairly evenly over weekday office hours, without any day reaching more than 18% of the time allocated to research.

Perhaps even more revealing is the pattern of student-contact hours. University teaching staff are well-known for keeping student-contact hours to times that suit the academics. Frequently, just a few hours on specified days are posted on their office doors, and contact outside these hours is discouraged. However, universities have become more attuned to electronic communications and many crucial course materials are provided on online. Similarly, student assignments are submitted online, and often marked and recorded on online. Email communication is frequent and it seems to be more difficult to control this than face-to-face consultations. This is changing the experience of working as an academic. In contrast to traditional practices, the hours of student consultations are leaking into times of day and days of the week beyond normal office hours. This is shown in the right panel of Figure 12, below.

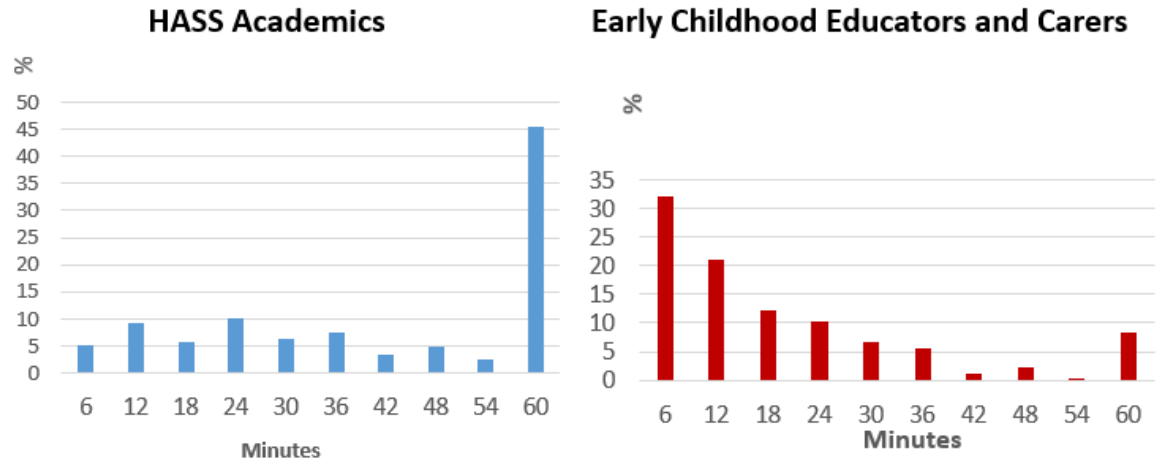
Figure 12: Timing of research activity and student contact



Duration of activity episodes (to the nearest six minutes)

It is possible to get some idea of the texture of the work process by assessing how much fragmentation of activity happens within the sampled hour. Occupations differ in how much switching they demand between different tasks. It is revealing to contrast the results for academics with some preliminary findings from a pilot study of early childhood educators and carers (Figure 15, below). Since using RTS means research subjects respond to a question about the duration of tasks during the last hour to the nearest six minutes, this constrains the minimum length of an episode they can record to six minutes and the maximum to 60 minutes. The predominant (modal) episode of academic work is at the extreme upper limit, 60 minutes or more. In contrast, the most frequent episode among early childhood workers is at the opposite extreme, lasting six minutes or less. Indeed, the proportion of early childhood educators/carers reporting episodes beyond the minimum progressively falls with each extra six-minute increment until 60 minutes is reached. The clustering around 60 is most likely an artefact of the window of time being measured, and probably the actual length of the episode would spread beyond 60 minutes.

Figure 15: Comparison of length of work tasks (to nearest 6 minute interval)

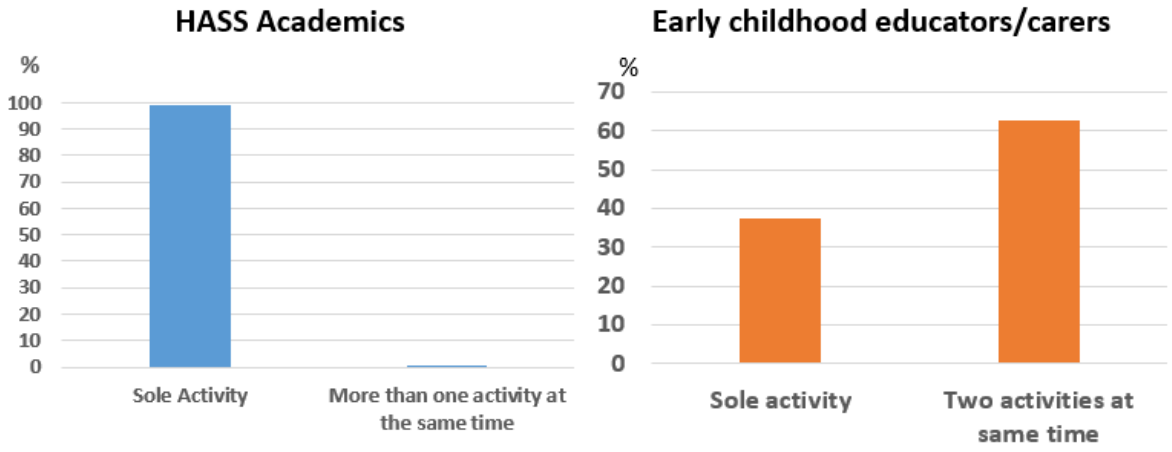


Cognitive psychologists have researched the effects of changing tasks and argue that experiments have demonstrated that there are 'switching costs'. These 'costs' are evident both in slower reaction times and higher error rates than when executing a single task (see, for example Gilbert and Shallice 2002). It is possible that regular switching between short-duration tasks contributes to the sense of job strain. Conversely, being able to concentrate on a single to task for an hour or more might increase the sense of job control, reducing the experience of job strain.

Multi-tasking required?

In contrast to Adam Smith's famous description of specialization in pin-making, where workers repetitively perform a single task that is one small fractional component of the whole production process, an alternative method of intensifying the use of time is to multi-task, i.e. to pursue more than one task simultaneously. In this method, a single operative produces more than one component of a good or a service at the same time. While this demands dividing attention, it often succeeds in making productive use of 'downtime', for example, when a blacksmith in olden times waited for metal in a furnace to reach the appropriate temperature, or a sailor waited for the appropriate tide. Figure 16, below, shows that multi-tasking is the predominant requirement for early childhood educators/carers, with over 60% of the typical hours of work involving multi-tasking. In contrast, academics predominantly engaged in a single task.

Figure 16: Comparison of frequency of multi-tasked events in two occupations



Self-rated measures of the experience of work

These measures fall into two broad classes: (1) global or summary ratings of the overall experience of work in a particular occupation; and (2) ratings of the experience of the hour just measured. The two types differ because the first type is a measure of the predominant feeling tone working that occupation, while the second type can capture fluctuation or transitory moods states (and the circumstances in which they occur). Most of the occupational psychology literature relies on the first type – summary measures of the experience that apply to all occupations – probably to maximise applicability. Some Experience Sampling Method (ESM) studies capture mood in a known context, because they collect activities, thoughts and inner states (feelings) in natural settings at the instant of a randomly-chosen alert (Csikszentmihalyi and Larson 1987; Sullivan 1996; Gershuny and Sullivan 1998). Varieties of the RTS software have been designed to measure not only the more conventional global self-rating of one aspect of an occupation, but also something closer to the study of transitory feelings at a particular point in time. This latter approach asks respondents to rate their experience of employment-related activities in the randomly-chosen last hour. These two alternatives do not exhaust the potential of RTS software, but that potential is constrained chiefly by what is a reasonable burden of reporting that respondents can tolerate.

Global self-rated experiences of components of 'job strain'

Epidemiological studies show strong associations between global measures of poor job quality on the one hand, and on the other, mortality and morbidity (especially rates of cardio-vascular disease and the risk of mental illness). Indeed meta-analyses of the scholarly literature on 'job strain' or 'effort-reward imbalance' have found that these job qualities are the strongest risk factors for mental illness (Stansfeld and Candy 2006).

Where there is imbalance between (high) job demands and (low) 'job control/support', these theories predict 'job strain'. Job strain results in negative outcomes for both employees and organisations – job-related anxiety, health complaints, exhaustion and dissatisfaction. Job control ('decision latitude') is characterised by 'the working individual's potential control over his tasks and his conduct during the working day' (Karasek 1979: 289-90). Thus, one basic premise of Karasek's Job Demand-Control model is that employees who can make their own decisions about how to meet their job demands do not

experience job strain – '[t]he individual's decision latitude is the constraint which modulates the release or transformation of "stress" (potential energy) into the energy of action' (Karasek 1979: 287).

The Effort-Reward Imbalance (ERI) model (Siegrist, 1996), as its name suggests, emphasizes reward rather than control as the counterbalancing influence to unreasonable job demands. 'The ERI-model assumes that job strain is the result of an imbalance between effort (extrinsic job demands and intrinsic motivation to meet these demands) and reward (in terms of salary, esteem reward, and security/career opportunities – i.e. promotion prospects, job security and status consistency)' (Bakker and Demerouti 2007: 310). High effort not reciprocated by rewards (i.e. high effort/low reward conditions) leads to arousal, stress, 'burnout' and, ultimately, the health effects associated with job strain (including mild psychiatric disorders). 'Having a demanding, but unstable job, achieving at a high level without being offered any promotion prospects, are examples of a stressful imbalance' (Bakker and Demerouti 2007: 310; De Jonge et al. 2000). In contrast to the Job-Demands-Control model, the Effort-Reward Imbalance theory accommodates personal characteristics, one example of which is 'over-commitment'. This is defined as a set of attitudes, behaviours and emotions reflecting excessive striving in combination with a strong desire to be approved and esteemed. According to the model, over-commitment is an intervening factor that may strengthen the imbalance between effort-reward.

Severe 'work overload' and extreme 'time pressure' have been considered emblematic of high job demands (Bakker and Demerouti 2007: 310). The standard question used as the indicator of 'work overload' – 'I never have enough time to get everything done on my job' – has five response categories, ranging from 'Disagree' to 'Strongly Agree' (French at al 1982). As shown in Figure 17 below (left panel), the result for the HASS academics exhibits a pronounced skew towards the extreme of the scale. Only around 3% disagree/strongly disagree with this statement and 7% neither agree nor disagree. But 89% either somewhat agree or strongly agree, with the majority (62%) choosing the extreme category of 'strongly agree'.

The best benchmark I could find for work overload in the Australian population overall was in the Longitudinal Study of Australia Children (LSAC). The drawback with this benchmark is that the adults in this survey were all employed parents with an eight-year-old child (since I arbitrarily picked Wave 3 of the K-cohort). Parents with children of this age are more likely that other sub-populations to have extraordinarily long hours of unpaid work, often combined with substantial hours of paid work. Even so, only 37% of these LSAC parents felt they 'never have enough time to get everything done on their jobs' (agree/strongly agree). Almost a third of these LSAC parents 'disagreed' and more than quarter 'neither agreed nor disagreed'. So the initial indications are that the HASS academics experience severe work overload, suggesting that their job demands are very high.

The standard question about time pressure is 'How often do you feel rushed or pressed for time?' It has a long history of use in surveys (Robinson and Godbey 1997) by national statistical offices in North America, Europe and Australia. Collapsing the categories 'often' and 'always' allows us to easily compare the results of the HASS pilot study with the proportions reported by the adult Australian population in the latest (2006) Australian Bureau of Statistics' Time Use Survey. Whereas 78.5% of our academic respondents reported feeling often/always 'rushed and pressed for time', the national average for full-time employed persons was distinctly lower – somewhere between 56% for males and 65% for females. While many factors influence the perception of being rushed and pressed for time,

the strong skew in the distribution towards the 'always rushed' end of scale is *prima facie* evidence of academics experiencing their lives as time-pressured.

This impression is reinforced by two further items (not shown in Figure 17). First, the 'rushed' question is usual paired with a reversed version – 'How often do you feel you have spare time and you don't know what to do with it?' (This has five response categories ranging from 'never' to 'always'). The modal response of the HASS academics is 'never' (45%), while the proportion answering 'always' is less than 3%. The second support comes from the academics' responses to an item combining two elements of the European Survey of Working Conditions. The first of the two elements asked respondents to rate the 'pace' at which they worked, the second, whether they 'worked to tight deadlines'. The European survey asked these questions separately, on a seven-point scale, although the European experience is that these two questions are always highly correlated. Like the general question on time pressure, the distribution of the academics' answers on the 'pace' of work and the 'tight deadlines' is heavily skewed toward the right. The modal response (39%) is the most extreme category, 'all the time'. Only 2% of the pilot population answered that they 'never' had to work quickly or to tight deadlines. Roughly a quarter said that they 'sometimes' or 'fairly often' had to work quickly or to tight deadlines, leaving almost three-quarters who said 'very often'/'all of the time'. The pilot study of academics used a five-point scale rather than the seven-point scale in the European survey. However, the median score of four out of five in the pilot study of academics is higher than the all-occupations-wide median in the European survey (between three and four out of seven).

Figure 17: ***Global ratings of 'work overload' and employment-related 'time pressure' among HASS academics***

On the basis of these results, the indicators are that the vast majority of full-time salaried academic staff feel they are being 'rushed and pressed for time', 'working quickly to tight deadlines', and that they 'never have enough time to complete the all their tasks on the job'.

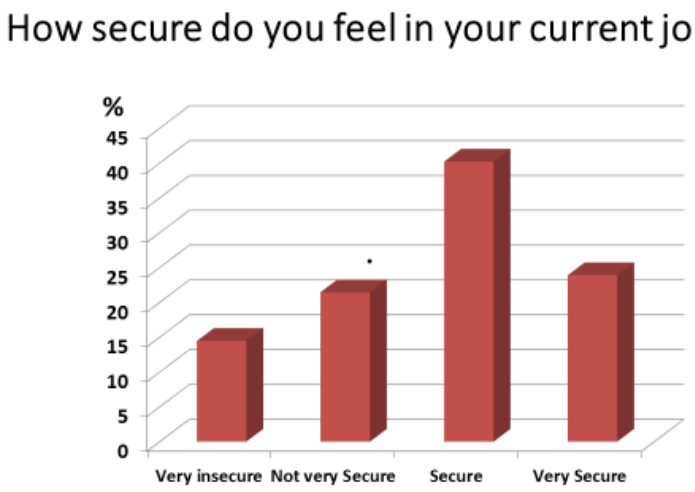
The Effect-Reward Imbalance theory draws our attention to the fact that job security is seen by employees as a sign of reward for effort. Job security is seen as 'recognition' of the value of an employee's work, and that in turn is probably reflected in the employee's increased in self-esteem and motivation. However, the managerial desire for 'flexible' labour runs counter to job security. Under the employer preference for flexible labour hires, the prevalence of job insecurity has increased

in recent decades, and it is suggested that this associated with poorer health outcomes (Sverke and Hellgren 2002).

Over a third (36%) of our pilot population classified their job as 'insecure' ('very insecure/not very secure'). Once again, the best benchmark for the Australian workforce overall was the Longitudinal Study of Australia Children (LSAC), which was the source of this item. The rate of having feelings of job insecurity in the sub-population of employed parents with an eight-year-old child was less than a third (10%) of the rate of HASS academics in my pilot survey.

The Fifth European Working Conditions Survey (2010) revealed that manual workers (low-skilled=23%; high-skilled=18%) experienced more insecurity than clerical workers (low-skilled=16%; high-skilled=11%), and that low-skilled workers experienced more insecurity than high-skilled ones. Moreover, job insecurity levels were observed to have increased since 2005. This Survey also found that 53% of temporary agency workers had poor employment security, in contrast to 39% of those on fixed-term contracts, and to 11% of permanent employees. In 2005, the respective figures were 43%, 35% and 10%. As in the workforce more generally, academic 'tenure' has eroded as a result of the rise of casual, fixed-term appointments and the broadening of grounds for dismissal.

*Figure 18: **Global ratings of job security (rewards) among HASS academics***



Bakker and Demerouti (2007) have argued that the Job Demands-Control model and Effort-Rewards Imbalance can be reconciled into a single model, which they call Job Demands-Resources (JD-R). They argue that 'job demands' vary by occupation and the concentration on 'work overload and time pressure' ignores the emotional/psychological cost of efforts in many occupations. The conception of psychological costs is at the heart of the Effort-Reward Imbalance model, so expanding 'job demands' in this way helps to reconcile of the insights of Karasek (and Karasek and Theorell 1992) and the ideas of Siegrist and his collaborators. It is also applicable to different occupational settings, irrespective of the particular demands and resources involved. 'Job demands', according the Bakker and Demerouti, 'refer to those physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skills and are therefore associated with certain physiological and/or psychological costs' (2007: 312). Job resources, the other hand, are benefits, not costs:

> Job Resources refer to those physical, psychological, social, or organizational aspects of the job that are either/or:
>
> - Functional in achieving work goals.
> - Reduce job demands and the associated physiological and psychological costs.
> - Stimulate personal growth, learning, and development.
>
> … Job resources may be located at the level of the organization at large (e.g. pay, career opportunities, job security), the interpersonal and social relations (e.g. supervisor and co-worker support, team climate), the organization of work (e.g. role clarity, participation in decision making), and at the level of the task (e.g. skill variety, task identity, task significance, autonomy, performance feedback). (2007: 312-13).

So instead of the traditional items measuring 'job demands' with items of 'time pressure', 'pace', 'tight deadlines' or 'work overload', , items consistent with JD-R (e.g. Bakker et al 2007) can be programmed into the RTS app in their place, especially as first-time-only questions.

Real-time measurement of the experience of the employee

The difficulty with one-time-only summary questions about the subjective experience of work is that the experience might be transitory. This is acknowledged in many of the items with a question asking which state predominates. Respondents are given response categories asking for a summary of the frequency of 'being rushed' or 'working at high pace' or 'to tight deadlines'. Jobs have varying rhythms, for example, sugar-cane cutting is seasonal, sandwich-shop workers typically face maximum demands at lunch time (in terms of pace, time-pressure and tight deadlines), and (famously) restaurant chefs, kitchen staff and waiters experience increasing pressure of job demands as the time of serve the customers food with only an small delay approaches (Whyte 1948).

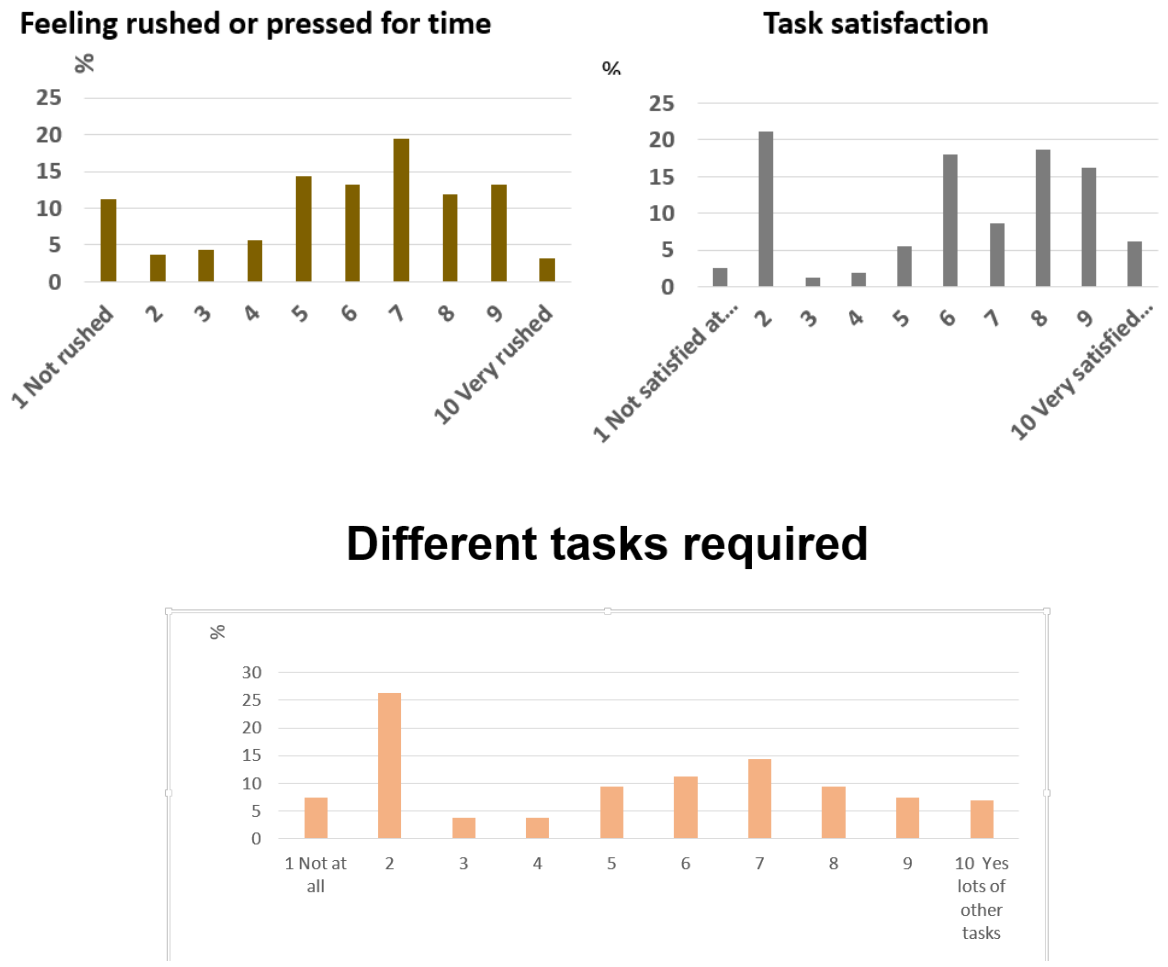
Treating these experiences as fluctuating states rather as fixed (summary) characteristics of the experience of the job has the advantage of making it possible to investigate the circumstances associated with elevated states.

In practice, it is easiest to ask the respondents to rate aspects of their experience of the whole hour of the employment-related activities they have just reported. There will be variations throughout the hour collected: whether there were many activities in the last hour or only one; whether activities were performed sequentially or simultaneously; and whether circumstances required activities were performed under pressure, without the social support of work colleagues, etc. While ideally it would be best to have information about the experience of each activity separately. But in practice this increases the respondent burden so radically as to threaten cooperation. However, gathering the information about on hour is possible and, with modern statistical techniques, it possible to disentangle influences and detect the circumstances most strongly associated with high psychological costs.

The study of early childhood educators/carers is gathering real-time measurement of states of experience, using RTS. Specifically, this study is measuring self-rated job satisfaction, time pressure, and whether respondents are required to do a number of specific things. All these aspects of the last hour are rated on a scale of 1 to 10 from low to high. However, this study is still in its early (pilot) stages, so the amount of data collected so far is insufficient to support any analysis of the circumstances associated with high job engagement and its extreme opposite – a heightened risk of 'burnout'. Nevertheless, there is sufficient data to suggest that there will be a reasonable distribution

of response to facilitate further analysis when the data from the planned large sample has been collected.

*Figure 19: **Early Childhood Educators/Carers' feelings about 3 aspects of work during last hour sampled.***



Summary

The RTS system is a low response-burden, highly flexible, programmable tool for capturing crucial aspects of what happens in the workplace, while ensuring respondents have some protection against misuse of the information provided. It fills an important gap in our knowledge of how time is used. It can be used to estimate hours of work and the allocation of time to subtasks in extraordinary detail, and it captures times when activity is fragmented, when there is frequent switching of tasks and when multitasking is required. It also provides information about the timing of activities by season, day of the week and time of day. In addition, the system can be used to gather vital information about the experience of work, either (1) as a summary of the properties of the job organisation, or (2) as the peaks and troughs (lulls) in the rhythm of the working day. These subjective experiences of work are linked to productivity and health (employee engagement, 'burnout', absenteeism, staff turnover, and morbidity and mortality rates).

Most people own a smartphone, and, indeed, respondents have been found to prefer the software to be loaded onto their own phone rather than carry a second phone. The data provided is automatically

downloaded to a website without any information to identify the respondent. Program syntax has been written to turn the information into easily analysable data. The system is remarkably cheap to administer, a fraction of the cost of a paper-and-pencil survey, and because of its automation, it capable of rapid analysis. No alternative data-collection method can provide this level of detailed information so rapidly and so cheap!

Notes

[i] Surprisingly, after some initial hostility scientific management became an explicit plank of the Soviet economic policy platform in the 1920s (Bittman 2016: 523-525).

[ii] http://ec.europa.eu/eurostat/documents/3859598/5884753/KS-CC-04-007-EN.PDF/03057369-0bfe-47d5-b584-be0868d65f29?version=1.0

[iii] This means that every unit in the population being sampled has an equal probability of being selected.

[iv] Other categories are displayed on the screen when you swipe the screen with your finger.

[v] The productivity of unpaid household production as a secondary activity is half that of unpaid household production conducted as a single primary activity (Williams and Donath 1993).

[vi] These spreadsheets often appear to assign workloads in term of units of time (typically hours), rather than the type of work to be done. Although there may be some arcane origins in public services regulations, current 'hourly loadings' seemed to have evolved through discussion in committees, rather than by any systematic gathering of empirical evidence.

[vii] This is calculated by first estimating waking hours by deducting the average sleeping time (from the latest Australian Bureau of statistics Time Use Survey) from 24 hours. Interestingly, 48% of the women and 53% of men in the Work and Careers in Australian Universities (WCAU) Survey estimated their workweek at over 49 hours per week (Strachan 2012: 35).

[viii] Including the USA. Only Japan, the Republic of Korea and Singapore have higher proportions of the workforce working long hours (Messenger and Ray 2013: 4).

[ix] The WCAU survey also collected data from 2,918 sessional teaching academics and 10,683 professional (general) staff.

[x] The two most influential ranking systems, The *Times* Higher Education, World University Rankings (THE) produced by England's most traditional newspaper and the Academic Ranking of World Universities (ARWU) produced by Shanghai Jiaotong University, use the institution's peer-reviewed publications, and citations, prizes and rewards as the basis of their rankings.

[xi] Increased proportions of research-only staff will affect the balance in time allocation between research and teaching. This growth of research-only staff is relatively recent and it has diverse roots. It is more typical of the STEM disciplines (Science, Technology, Engineering and Mathematics), than of the humanities and social sciences. This development is partly a response to a collapse of interest in studying the traditional natural science subjects, and a growing preference for minimal mathematics in upper high school departments, both of which have translated into drastically lower university enrolments. The nimble university STEM-departments maintained significance through increasing the proportion of staff employed in research-only activities. Since much of the funding for this research comes from grants (colloquially called 'soft money'), employment as time-limited, contracted staff (Research Office, Post-doctoral Fellow, Research Fellow), rather than as continuing employees, became common. Large-scale national competitive grants in the HASS fields of research are far less common, but Humanities staff (and to a lesser extent the Social Sciences) argued that what they required to progress the standing of their research was the ability to dedicate their time to it. This line of reasoning was given greater weight by the argument that women, as a result of the unequal, gendered division of labour around raising children, got stuck in the lower ranks of Australian academics, and that therefore affirmative action in early and mid-career might contribute to greater gender equity. The granting bodies expanded funding for Research Fellowships which relieved early and middle staff of teaching responsibilities for a few years. Under these circumstances, there has been a growth of the proportion of research-only staff in HASS departments in Australian universities, particularly in the older, well-established, so-called 'sandstone' universities.

[xii] The WCUA shows that there is a strong preference for spending less time in administrative duties.

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