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The hidden benefits of walking: is speed stealing our time and money?

Paul J. Tranter and Murray May
School of Physical, Environmental and Mathematical Sciences
UNSW@ADFA

Contact details:

Dr Paul J. Tranter
School of Physical, Environmental and Mathematical Sciences
University of New South Wales
Australian Defence Force Academy
Canberra, ACT, 2600
Australia
Email: paul.tranter@adfa.edu.au

Abstract
Walking provides a wide range of benefits, some of which are more obvious than others. The obvious benefits of walking include the benefits to the individual from physical fitness and mental health improvements. A less obvious benefit is the way in which getting more people walking more often can help to generate a stronger local community, which in turn will contribute to happier and healthier neighbourhoods. Yet there may be other benefits of walking that have remained largely hidden, even from those working in transport research. One of these hidden benefits is that walking can save you time and money. This may seem counterintuitive. We can only see this hidden benefit of walking if we understand the concept of effective speed: a holistic way of evaluating speed in which all the time costs of a mode of transport are taken into account. The paper provides two examples that show how walking can save us time and money, and how "faster" forms of transport steal our time and money without most of us realising this. The first example involves a comparison of two suburban scenarios, one in which most children walk to school, and the other in which parents 'save time' by driving their children to school. The second example examines real data for Transport Geography students at the Australian Defence Force Academy (ADFA), comparing the effective speeds of walking and using taxis for a journey frequently made by cadets, from the city to ADFA.

Biographies

Dr Paul Tranter is a Senior Lecturer in geography at UNSW@ADFA. His research interests include the themes of child-friendly environments and sustainable cities, the public health impacts of motorsport, and the promotion of active transport through the concept of 'effective speed'. Paul enjoys cycling, commuting by public transport and walking around his neighbourhood, and appreciates the links between active transport, social contact and healthy communities.

Dr Murray May worked for over 20 years in the public service in Canberra on environmental and health policy issues, from both national and local perspectives. His interests include sustainable transport, road safety, ecological and consumption issues, and futures studies. He recently collaborated with Paul Tranter on a project on the concept of "effective speed" for the Australian Greenhouse Office.

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Paul J. Tranter and Murray May
School of Physical, Environmental and Mathematical Sciences
UNSW@ADFA

Introduction

Walking provides several advantages to those who engage in it, including the benefits to the individual from physical fitness and mental health improvements. A less obvious benefit is the way in which getting more people walking more often can help to generate a stronger local community, which in turn will contribute to happier and healthier neighbourhoods. These advantages have been well researched, including by those involved in Walk21 conferences. However, one advantage that is poorly understood and rarely researched is that walking can save us time and money. To understand how this could be so, we need to understand the concept of "effective speed".

This paper explains the concept of effective speed, outlines previous research on effective speed, and provides two examples that show how walking can save us time and money. These examples also demonstrate that "faster" forms of transport can steal our time and money without most of us realising this. The first of these examples involves a comparison of two suburban scenarios, one in which most children walk to school, and the other in which parents 'save time' by driving their children to school. The second example examines real data for Transport Geography students at the Australian Defence Force Academy, comparing the effective speeds of walking and using taxis for a journey frequently made by cadets, known as "the walk of shame".

The concept of ‘effective speed’

‘Effective speed’ is a holistic measure of speed calculated on the basis of the total amount of time consumed by a particular mode of transport (Tranter, 2004; Tranter and May, 2005b; Tranter and May, 2005c; Tranter and May, 2005a). Applying this concept of ‘effective speed’ provides some surprising results in the comparison of cars, bicycles, public transport and walking.

We have found the following story a useful way of demonstrating the importance of the concept of effective speed. Imagine that you live in the year 1800, in a village where it is your job every day to walk to the river and bring back a large bucket of water. This takes you an hour each day. But you are a genius, and you design a machine to collect the water for you. This machine consists of cogs, pulleys, cables and springs. All you need to do each day to collect your water is to pull a lever. Your time saving ‘machine’ then takes the bucket to the river, fills it and brings it back to you. Your machine saves you an hour every day. Of course, the only catch is that to make the machine work, you must devote an hour each day to the task of winding up the spring.

The concept of effective speed includes consideration of the time that we devote to making our machines work for us. Though we rarely need to wind up springs, we do need to spend time at work to earn the money to pay for our machines (and to pay for the various costs created by the use of these machines). Most car drivers and most policy makers pay little attention to the time devoted to 'winding up the springs'. But just as it would be delusional to believe that your water-fetching machine had saved you time, the supposed time savings provided by cars (and other fast modes of transport) may also be illusory.

Effective speed can be calculated using the formula:
"<u>Speed</u> = <u>distance</u> divided by <u>time</u>", where

- <u>distance</u> is the total kilometres travelled, and
- <u>time</u> is the total time devoted to the mode of transport (including the time spent at work to earn the money to pay all the costs created by the particular mode of transport).

In the calculation of car speed, the time required for car travel is rarely adequately considered. Most drivers consider only the time spent in the car while it is moving (and perhaps while it is idling) when estimating their average speed. They ignore the considerably larger amounts of time that must be devoted to their cars. As well as the time a driver must spend sitting in a car, he or she must spend time earning the money to make the car travel possible. When this time is taken into account, along with other time devoted to the car, it is apparent that the car does not save us as much time as we think it saves us.

The concept of effective speed can be traced back to 1854, with various writers since that time having shown an awareness of the ideas behind the concept. The first person to bring attention to the idea behind the effective speed argument was probably Henry David Thoreau in his book *Walden,* first published in 1854. In *Walden*, Thoreau (1960, 47) argues that "the swiftest traveller is he that goes afoot". He compares his own speed, as a pedestrian, with the speed of another traveller who takes the train to a nearby town:

> "I start now on foot, and get there before the night. You will in the meanwhile have earned your fare, and arrive there some time tomorrow, or possibly this evening, if you are lucky enough to get a job in season. Instead of going to Fitchburg, you will be working here the greater part of the day. And so, if the railroad reached around the world, I think that I should keep ahead of you" (Thoreau, 1960, 47).

Thoreau was aware that there was no 'effective' speed advantage in train travel in the 19th century, at least for people who were not very wealthy. In 1974, Ivan Illich wrote his thought-provoking book *Energy and Equity*, in which he brought Thoreau's arguments into the 20th century. Illich explained:

> "the typical American male devotes more than 1,600 hours a year to his car. He sits in it while it goes and while it stands idling. He parks it and searches for it. He earns the money to put down on it and to meet the monthly installments. He works to pay for petrol, tolls, insurance, taxes and tickets. He spends four of his sixteen waking hours on the road or gathering his resources for it … The model American puts in 1,600 hours to get 7,500 miles: less than five miles per hour" (Illich, 1974, 18-19).

In 1990 the German sociologist D. Seifried (Whitelegg, 1993a; Whitelegg, 1993b) used the phrase "social speed" to describe the average speed of a vehicle after hidden time costs are considered. Seifried considered the time spent at work to earn the money to pay for the car and its running costs, as well as the external costs of the car. Such external costs include environmental and social costs (e.g. accident costs). Seifried's calculations indicated that when all costs are considered, the "social speed" of a bicycle can be faster than a car.

Kifer (2002) conducted an assessment of the multitude of costs associated with running a car in the United States, including the direct costs used in the calculation of "vehicle operating costs" by motoring organisations, as well as various hidden or indirect costs of cars. When only the direct costs to the motorist are considered, the "net effective speed" of US motorists was estimated to be a mere 9.7 mph (assuming a trip speed of 25 mph as the probable US average for cars). (These 'direct costs' did not include parking costs, tolls, fines or vehicle accessories.) When the highest estimates of external costs were included in the calculations, the "net effective speed" fell to a mere 5.8 mph (Kifer, 2002). He makes the point that "in **all** of these cases, the speed of the automobile is no greater than that of a bicycle. The slowest speed is not much above my 4.5 mph walking speed" (Kifer, 2002). Kifer's estimates of external costs were based on two detailed studies of the direct and external costs of cars, the first by the Conservation Law Foundation and the second by the International Center for Technology Assessment (Burrington, 1994; International Center for Technology Assessment, 1997). The second of these studies calculated that if US motorists had to pay the full costs of driving their cars, gasoline costs would increase from $1 per gallon to between $5.60 and $15.40 per gallon! The reason for the wide variation is the difficulty of defining or measuring external costs, particularly when some of these costs may not be felt in the current generation.

Research by Tranter (2004) and Tranter and May (2005b) indicates that the effective speeds of different modes of transport in Australia show car travel to be surprisingly slow. Even looking only at the direct costs of motoring, drivers of new cars in Australia have effective speeds lower than cyclists, or bus and train passengers. Some drivers (e.g. those on low incomes who own cars with high operating costs) have effective speeds that would be lower than pedestrians. If the cost of oil continues to increase, as many observers believe to be inevitable (Deffeyes, 2005; DiPeso, 2005; Heinberg, 2006; Hirsch et al., 2006; Tranter and Sharpe, 2006 (forthcoming)), the effective speeds of motorised modes of transport are likely to increase even further, making cycling and walking even more competitive.

In calculating effective speeds for different modes of transport, it becomes clear that the main time component for walking, cycling and public transport trips involves the time spent making each trip. However, for car drivers, a major time component is the time spent earning the money to pay for: the car, the registration, the insurance, the fuel, the servicing and repair costs, the tolls, the parking costs, and other costs (e.g. speeding fines). The significance of this is profound if we use such considerations to evaluate any investment in roads to increase trip times. It is futile to try to increase the effective speed of car drivers by decreasing trip times, because this does nothing to reduce the time spent 'winding up the spring' (in fact it increases it, as we have to pay more taxes to pay for road building) (Tranter, 2004).

If our transport goal is to increase speeds (and we are not arguing that it should be), it is far more effective to spend money on increasing speeds for pedestrians and cyclists, than it is on increasing car speeds. The majority of any increase in trip speed for non-motorised transport is reflected in increased 'effective speed'. If our transport goal is to save time while maintaining accessibility, then providing the opportunity for more people to walk more often is a useful strategy. This applies to children as well as to adults, as explained in the following example.

Can walking to school "save us time"?

To understand the way in which walking to school could save parents time and money, we can consider two scenarios:

- Scenario A, a city in which every household with children "saves time" by driving their children to school and to other activities (e.g. sport), and where every household has two or more cars, and
- Scenario B, a city in which children walk to school, in Walking School Buses (or with other children), and where most households have no car or only one car.

To understand the total time (and money) costs associated with the two scenarios described, let us consider the likely outcomes.

First, in scenario A, where households "save time" with their cars, we can identify the following points:

- parents spend a considerable amount of time at work earning the money to pay for a second car that 'might' save them 30 minutes a day on the journey to school (compared with walking)
- because their children don't get exercise walking to school, parents drive them to organised sport (Tranter, 2006)
- because local streets are too dangerous (partly because of the traffic generated by parents driving their children around), parents must drive their children to the local playground

- because their children don't know other children in the local area, they have to be driven to their friends houses
- parents expose their children to higher levels of pollution, including in-car pollution (International Center for Technology Assessment, 2000)
- drawing a longer bow, when their children are older they may have to drive them more often to the doctor or to the psychologist, as their children are more likely to be "fatter, sicker and sadder" (Tranter, 2006; Gleeson, 2005).

What is the collective impact of "saving time" with their cars? Not only do parents who adopt the strategy of "saving time" by driving their children to school find themselves spending increasing amounts of time driving their children to other locations, but they also have to spend more time at work, simply to earn the money to keep the second car on the road. Even if a household was to purchase a new car with the highest possible effective speed in Australia (a Kia Rio or a Hyundai Getz), a person on an average income would be spending about 1¼ hours per day simply earning the money to pay the range of direct costs associated with this car. Note that this figure does not include the external costs of cars (e.g. environmental impacts such as their impact on global warming).

In the alternative scenario, Scenario B, Walking School Buses have led to a culture where most children walk to school. In Scenario B, children

- get to know local friends
- feel a part of the local community
- are fitter, happier and healthier (O'Brien and Tranter, 2006)
- don't have as much need to be driven to sport
- are more likely to be able to cope with life's challenges when they get older (Marano, 2004).

In Scenario B, parents:

- get to work by public transport or cycling (which have effective speeds higher than many cars)
- use their cars only rarely
- save time by not having to work as long to support the second car
- don't need to drive their children to other places (sport, their friends) as often.

By thinking about the journey to school in a more holistic sense, we can see that those parents and children in Scenario A have "less time" and "less money" available, because of the way that their cars have stolen their time and money. The parents and children in Scenario B have not only saved time and money, but they are more likely to be happier, fitter and healthier as well.

Can walking be faster than taking a taxi?

Most of us will be able to identify examples where it would be faster to walk than go by taxi. The central areas of most major cities are often so congested with motor vehicles that pedestrians can easily overtake cars stuck in traffic.

But even in a low density city such as Canberra, taking a walk can be faster than taking a taxi if the concept of effective speed is applied.

In the Transport Geography course taught by Paul Tranter at the University of New South Wales, Australian Defence Force Academy campus (UNSW@ADFA), students are required to complete an original research project on a topic. One project in 2006 was conducted by a group of three students on the topic of "effective speed" (Hofbrucker et al., 2006). The three students chose to examine a particular walk often conducted by ADFA students, and known amongst the students as "the walk of shame". This entailed walking back to ADFA from Civic (central Canberra) after they had spent all their money on entertainment.

The students examined the effective speed of taxis and walking for making the trip from Civic to ADFA. They first calculated the hourly wages of cadets at ADFA, which ranged from $2.20 to $3.05, depending on the Year level of the student (Hofbrucker et al., 2006). They then estimated the costs of a taxi ride from Civic to ADFA. On average, the journey from Civic to ADFA costs $12. Thus the cost of the taxi fare ranged from $12 for one person per taxi, to $3 for four persons sharing the taxi. (Four persons is the maximum number of passengers for most Canberra taxis.)

Using the information on cadet incomes and the cost of taxi fares, it was then possible to calculate the time devoted to earning the money to pay for the taxi fare. The students were surprised to discover that this time ranged from 5½ hours for a first year student catching a taxi alone, to one hour for a third year student sharing a taxi ride with three other students.

The effective speed of the taxi was then calculated, taking into account: the time it takes for a cadet to earn the money to pay for a taxi fare, the time it takes to wait in the taxi line, and the time of the actual journey in the taxi from Civic to ADFA. The effective speed of the taxi trip ranged from less than one km/h (first year student travelling alone) to 3.5 km/h (third year student sharing the cost of the taxi fare with 3 other students).

The students then compared this with the effective speed of walking. Given that the costs of walking are either close to zero (or negative if you count the various benefits of walking such as improved health and fitness), the effective speed of walking is virtually the same as the actual speed of walking. The ADFA students argued that for them, this speed would be the same as their marching pace, which they instinctively adopt after years of drill training. Marching speed, at quick march, is 5.4 km/hour. For the ADFA cadets, walking is far faster than taking a taxi!

Conclusion

The case studies above show that when a holistic assessment is made of transport speeds, walking can be shown to be competitive with cars and taxis. The more variables that are considered in this assessment, the more competitive walking becomes. For example, if we take into account the time that car drivers have to devote to exercise (which may also involve a car trip to the gym), this is yet another time cost that people who walk do not have to worry about. Simply by switching from car travel to walking, we can prevent speed from stealing our time and money.

An awareness of the concept of effective speed has led to travel behaviour change for some ADFA cadets, who discovered that their own effective speed as car drivers was lower than their cycling speed, and in some cases lower than walking speed.

Nevertheless, to meet the challenge of having people undertake a more holistic evaluation of their travel behaviour, as implied in the effective speed concept, it is important to apply findings from social science about what motivates people's behaviour. Behaviour change programs often assume that people will change behaviour if they receive information about why and how to reduce car use. This assumption is incorrect (Ampt, 2003; McKenzie-Mohr and Smith, 1999), and is based on an "impoverished view of the complexity of human-social engagement" (Hobson, 2001, 193).

Travel patterns are most likely to result from a combination of habits and circumstances, with routine and habitual behaviour likely to involve "practical consciousness" that is rarely questioned. What is critical is a shift from "practical consciousness" to "discursive consciousness", where a change in behaviour is facilitated by debate about behaviours taken for granted.

Because the effective speed concept is a way of thinking not generally applied in the community, community-based approaches that enable more discursive debate appear to be better suited to the application of this concept. This allows perceived barriers and benefits to be addressed in a more considered way. Further, it enables benefits in terms of the values of the participant (whether it be to save time, money, the environment or gain independence or fitness) to be considered in relation to behaviour change that is likely to be sustained (Ampt, 2003). The necessary conditions operate in TravelSmart programs through the use of "individualised marketing", with the process of change facilitated by direct contact with the individuals concerned. The ensuing discussion enables the questioning of habitual travel behaviours, and information and advice specific for people's circumstances are provided.

A particular strength of the concept of effective speed, however, is at the policy level. Any transport policy that fails to consider the concept of effective speed, and focuses solely on trip speeds, is falling into the trap of ignoring the time spent 'winding up the spring'. Even if it is possible to design a road system that allows cars to travel at slightly higher average speeds, this may not reduce the total time devoted to transport. In fact, it may increase the total time. This is because of the extra time required to pay for the road building, as well as the induced traffic created by new roads, which then increases trip times through congestion. However, while building new roads for cars may be futile, an investment in facilities for pedestrians and cyclists represents a good transport policy.

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