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THE USE OF COUNTING METHODS IN THE MONITORING OF THE IMPLEMENTATION OF A CYCLE-WAY NETWORK

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THE USE OF COUNTING METHODS IN THE MONITORING OF THE IMPLEMENTATION OF A CYCLE-WAY NETWORK

In France, measuring systems concerning the bicycle use are rare.
This paper has two principal aims : to describe some bicycle counting methods, evaluating the interest of the data obtained, and to verify that these methods provide valuable information for the planning of a bicycle network. The method used consists of replacing a long monitoring period of counting in specific sites with a special treatment of factors (seasons, peack hours, weather, week-days), with a relatively short period of counting at many geographically different sites. The techniques used are numerous (manual, pneumatic, video ...).
Finally, the data obtained can be a very valuable tool in persuading local authorities to readapt their infrastructure policies to real bicycle use.

DIE ANWENDUNG VON ZÄHLMETHODEN BEI DER BEOBACHTUNG DER REALISIERUNG EINES RADWEGENETZES

In Frankreich sind Systeme zur Quantifizierung des Fahrradgebrauchs eine Seltenheit.
Dieses Referat verfolgt zwei grundsätzliche Ziele. Erstens sollen einige Methoden zur Zählung von Fahrrädern beschrieben werden, wobei auch die Bedeutung der gewonnenen Daten bewertet wird. Zweitens soll nachgewiesen werden, daß diese Methoden wertvolle Informationen für die Planung eines Radwegenetzes liefern. Die angewandte Methode besteht darin, einen langen Beobachtungszeitraum, während dessen an spezifischen Stellen Zählungen durchgeführt und verschiedene Faktoren (Jahreszeit, Spitzenzeiten, Wetter, Wochentage) speziell berücksichtigt werden, durch einen relativ kurzen Beobachtungszeitraum zu ersetzen, in dessen Verlauf an vielen unterschiedlichen geographischen Orten gezählt wird. Dabei werden zahlreiche verschiedene Methoden angewandt (händisch, pneumatisch, Video...).
Schließlich können die gewonnenen Daten ein sehr wertvolles Werkzeug sein, wenn es darum geht, die Lokalbehörden zu überzeugen, ihre Infrastrukturpolitik an den realen Fahrradgebrauch anzupassen.

UPORABA METOD ZA PREŠTEVANJE V NADZOROVANJU IZVAJANJA ŠIRITVE KOLESARSKIH STEZ

V Franciji so sistemi merjenja uporabe koles redki.
Ta prispevek ima dva glavna cilja: opis nekaterih metod za preštevanje koles, ocenitev pomena dobljenih informacij in potrditev, da te metode zagotavljajo dragocene informacije za načrtovanje kolesarskih mrež. Pri metodi, ki smo jo uporabili, so dolga obdobja opazovanja in štetja na določenih mestih ter posebna obdelava faktorjev (letni časi, ure najpogostejšega prometa, vreme, delovni dnevi), nadomeščena z relativno kratim obdobjem štetja na večih geografsko raznolikih mestih. Uporabiti je moč veliko različnih tehnik (ročno, pnevmatično, video...).
Končno, so dobljeni podatki lahko dragoceno orodje pri prepričevanju lokalnih oblasti za prilagajanje infrastrukturne politike resnični rabi koles.

SLOVENSKO

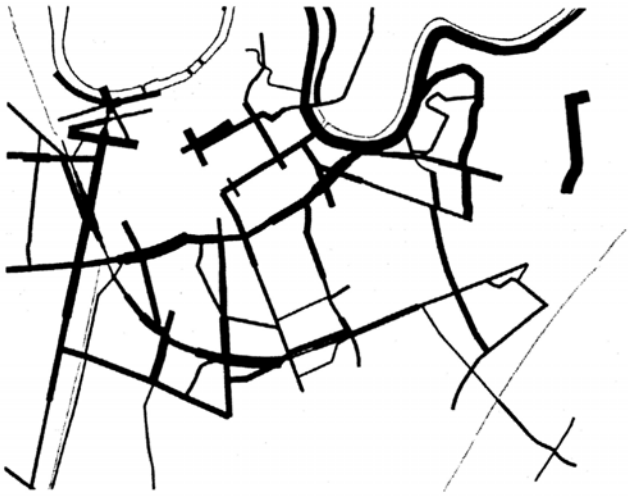
THE USE OF COUNTING METHODS IN THE MONITORING OF THE IMPLEMENTATION OF A CYCLE-WAY NETWORK

Most French local authorities have very little data about urban bicycle use. How is it evolving ? Who is cycling ? Where are cyclists riding ? Do cycling facilities correspond to cyclists requirements ?
Most of the time, the only available data are from household surveys. They can provide information on average transport use patterns, over long period of time, but are unable to give precise details of bicyle use.
Furthermore, the approach is heavily biaised towards infrastrucutre proposals without looking at what cyclists actually want. This leads to situations where new cycling facilities are little used because they are not adapted to cyclists' needs.
In addition to this lack of information on cycling network use, local authorities have no way to measure the impact of the cycling facilities that they have provided.
Local authorities, therefore, find it difficult to react to cycling problems (such as an accident on a roundabout, or non-used of a cycle-way), even if they are directly responsable for the network.
On the other hand, these same local authorities have a much more precise approach to the question of public transport: using usage rates per line, peack hours, customer categorisation etc.

In this paper, we would like to show that it is possible for a bicycle development policy to follow the evolution, or the non-evolution in some cases, of bicycle use on new bicycle specific facilities. The method proposed is cheap, uses simple techniques, and can provide data aver long periods of time.
The following proposals are based on our experience working as consultants for many French local authorities.
Even though counting methods are regularly used in road use analyses they are, inexplicably, little used in France, to study the effect of bicycle use policies and their evolution.
Firstly, we will look at the application of counting methods to bicycle facilities and urban bicycle use. Secondly, we will define the different counting techniques which are currently available. Finally, using our experience as consultants, in France, we will suggest what we believe is the most efficiant approach to the monitoring of the implementation of a cycle-way network.

FRIDAY

Doc 1 - Grenoble, France : Bicycle flow by roads (1998).



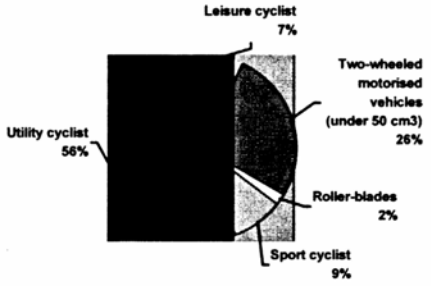
Why counting ?

- To identify priorities in terms of bicycle facilities. Bicycle flow can be different from one street to the next : bicycles as a proportion of total trafic can vary from 2 to 12%. With counting methods (counting cyclists), we can produce a hierarchy of cycling places (doc 1), given enough information to allow the provision of new facilities to optimise urban cycling.
- To discover the proportion of cyclists rotative to other modes of transport. The evolution of each mode of transport can be followed, providing a comparison of bicycle flow with that of car and public transport, for a stretch of road. With these flow data, the impact of a new bicycle facility can be observed by simply comparing before and after data.

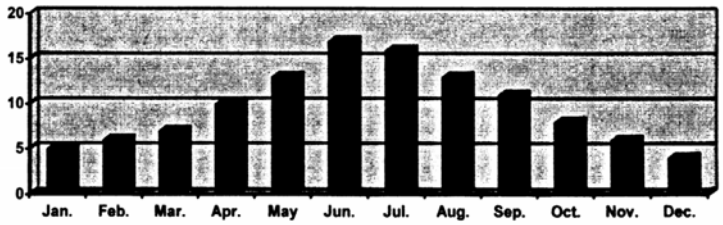
- To analyse the behaviour of cyclists. For example, at a crossroads, manual counting gives a very good view of cyclists behaviour : how they use the new facility ? Do they respect traffic lights ? What kind of accident risk are they facing ? Sometimes, these observations can force a radical rethink of the facility itself.
- To estimate the impact of the bicycle facility. Is the bicycle facility used enought by cyclists or not ? Is cycle flow increasing ? How many cyclists don't use it and still use the road with other traffic ? Counting methods can help us to improve bicycle facilities, or they can be used simply to monitor the ways cyclists use them.
- To pin-point the type of facility needed. As we have already seen, the design of bicycle facilities doesn't always take cyclists into consideration. The attitude of cyclists can be very different, be they young or old for example. or whether they cycle for sport or just to relax (doc 2). Counting methods must incorporate a long enough observation period to enable the type of cyclist concerned to be identified and thereby provide facilities that are adapted to their needs.

However, these methods have some methodological difficulties : seasons, peack hours, weather and week-days. The season is a very important factor in bicycle use (doc 3) : the number of cyclists in December, in Grenoble (France) is only 30% of the number in June. The wether is also an important factor : rain and cold severely reduce the numbers of cyclists. There are also important differencies between week-end and week-day cycle use, and between peack and off-peack times. Cyclist's motives are very different to those of motorists and cycle use through the day or through the week can show a very different distribution to car use.

Doc 2 - Grenoble, France, types of bicycle users (1998).



Doc 3 - France, average of bicycle traffic by month / season (1998)



These factors make counting methods unrepresentative of reality unless they take into account average daily bicycle use data.

As cycling consultants, we've been experimenting with a number of counting techniques (doc 4) :

- The visual manual counting consists of counting cyclists, noting their direction and the type of cyclist (sport, leasure etc.). At the same time, the counter can count two-wheeled motorised vehicles (scooters, motorcycles), disabled people, joggers, pedestrians and roller-bladers. Possible dangers are noted : children, adults and older people, cycling at different speed. The use, or not, of the cycling facility can be quickly observed by the counter. At junctions, it is possible to analyse the number of times cyclists have to stop, their mouvements, and, of course, classic data such as time, direction of trafic etc.

We believe that bicycle counting should be done, systematically, at junctions, because there are more roads which can be observed and conflicts and potential accident problems can be identify and analysed. In this way, counting periods can give " snap-shot " pictures of cycle use which can be incorporated into a bicycle trafic analysis.

But as we have said, manual counting methods have their limits unless they incorporate annual fluctuation data. Long counting periods (of several weeks for example), have the further disadvantage of incurring relatively high labour cost.

- By combining a manual counting method with a mecanical, many of these problem can be overcome as mecanical methods allow data to be collected over long periods of time. When associated with hourly, daily, and monthly wether data, the results can be used to adjust manual counting data. As mecanical methods record speed, the type of cyclist can be deduced, giving further useful for the design of new facilities. The main drawbacks of mecanical methods are that they give any qualitative information and that they don't distinguish between different types of vehicle. They are, therefore, only suitable for use on cycle paths. It's also difficult for mecanical methods to record groups of cyclists. The margin of error (5 to 10%) increases with volume of traffic. Data supplied by this method must be reajusted every time.

- Pneumatic counting methods are also interesting, recording the passage of bicycle by way of cable. These counters are sold in France by Sterella.
- Infra-red methods, which count cyclists as they cut an infra-red beam are unreliable as only one vehicle is recorded, even when a whole group of vehicles crosses the beam at the same time. Despite beeing cheap they are, therefore, unsuitable for counting cyclists.
- Magnetic field sensors, placed in the road surface, provide another method. They can record and differentiate between different types of vehicles (truck, car, bicycle) due to differencies in weight. However, sensors are usually placed in the middle of the carriageway not on the sides where most of the cyclists ride, and they do not detect non-ferrous frames (e.g. carbon, aluminium alloy...), so again it is not a reliable method for counting cyclists.
- There is a method, based on a change of capacitance of an electrical wire when a vehicle rolls over it, which can distinguish between different types of vehicles. Unfortunately, this particular piezzo-electrical method is currently unavailable in France.
- Video is used to monitor vehicle movements (types of vehicles and their behaviour) on some major roads in France. Technically this method could be very easily adapted to bicycle monitoring but its use remain very limited at the moment .
- The Technical Equipment Reseach Centre (CETE), in south-west France, has experimented a bicycle counting technique based on aerial photography. Because of its cost, complex operation (numerical pictures, use of an aircraft), and its " snape-shot" vision, this method is little used.

	Detection	Advantages	Drawbacks	Cost	Use
Pneumatic	Pneumatic pressure, cable, sensors	Reliable, cheap, easy to use	Can be stolen	600 to 800 Euros	Car an bicycle counting
Infrared	Record cutting of infra-red rays	Cheap	Unreliable, fragile		Counting pedestrians
Magnetic field	Detect ferrous metals	Reliable, available from local authorities	Difficult to use		Useful for dynamic traffic management
Video camera	Computerised identification of shapes	Invaluble for monitoring cycling direction and conflicts	Inadapted to urban areas, fragile	8000 Euros	Major roads
Aerial	Aerial numerical photography	Efficiant over a large area	Complex operation	Expensive	
Piezzo sensivity	Electrical wire	Easy to use	Not available in France	Cheap	Counting bicycles
Manual	Human observor	Very accurate for qualitative information	Cost	Expensive	Long counting periods

Doc 4 - Bicycle counting methods

FRIDAY

So, which technique to choose amongst all these ?
Based on our experience in French cities, we are able to say that the best approach to monitoring the implementation of a cycle-way network is to use a mixture of three techniques : one-day manual counting, on a small number of sites (to study the typology of users), a mecanical counting method (to readjust data and define variation ratios), and a peak hours traffic counting (cheaper).
This three-pronged approach will give an accurate picture of bicycle use in any place (cycle-way, roads etc.), the types of cyclist involved and their needs. This information is vital for anyone who wishes to analyse and design new bicycle facilities that are well adapted to the needs of cyclists.
We have just presented a few methods for measuring bicycle use and its evolution, and we would be very interested in discussing these ideas and any others which you may have.