Human and Technological Means to Assist Travellers with Disabilities: Interactions and Needs

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Abstract

We present here some of the main findings of a study conducted by SNCF Innovation & Recherche and the CHART THIM laboratory at Université de Paris 8 on the needs of people with disabilities during door-to-door journeys. The study consisted of three phases: focus groups, commented journeys, and subjective journeys with a GoPro camera. Various types of travellers participated in the study. Five focus groups were conducted: one with blind and visually impaired people (BVIP), one with people with intellectual disabilities (PID), one with people without disabilities (PWD), one with SNCF personnel employed on the mainline, intercity, and Paris region (Francilien) networks, and one with public transport personnel. Interviews of educators who give mobility training to people with intellectual disabilities were also conducted. All activities in the various stages of a door-to-door journey were discussed, from the preparation at home to the arrival at the destination, including all connections and the use of multiple transport modes (walking, bicycle, public transport, or motor vehicle). The objective was to bring to light the strategies, the kinds of assistance needed, the technological and human assistance provided, and the breakdown of this assistance. The importance of the sound and visual environment, time and technical constraints for SNCF employees, assistance from fellow travellers, etc. – the principal findings highlight the convergences, divergences, or complementary aspects of the needs of the groups studied.

Key words

Mobility, disability, accessibility, technological assistance, human assistance, travel, human need, reassurance.

1. Introduction and Context

Following numerous technology-focused studies on the mobility of people with disabilities (Rampe [1], Danam [2], Infomoville [3]) and with new developments in mobile technologies (smartphone apps) and the use of train, metro, and bus stations for commercial activities and events as well as transport, it seemed necessary to look again at the door-to-door mobility needs of people with disabilities. Our aim here, therefore, is to inquire into this matter with a view to optimising and improving the respective types of service that can or must be provided by technology, by transport personnel, or by fellow travellers, according to travellers expressed needs and work performed by this personnel. In which places, at which times, and in which situations should human assistance be offered? In which cases should preference be given to autonomy? How can autonomy be provided while taking into account each person's limitations and disabilities?

2. State Of The Art

A door-to-door journey can be envisioned as, in fact, a series of journeys, on foot and by vehicle: i.e. the traveller is alternately a pedestrian, the driver of a vehicle, or a passenger in one [4]. In terms of cognition, a journey is thus a series of moments when information is acquired and decisions are made with regard to waiting, getting to, and getting on the means of transport. In such situations, people with visual or intellectual disabilities are the ones most in need of assistance, despite the development of technologies, some inclusive and some exclusive [5] [6].

To deal with needs, autonomy can sometimes be provided by technological or human assistance. As Brangier explains [7]: "A need is not constructed in isolation; it results from complex transactions between a user, a creator, and an environment where imitation, learning, co-construction of knowledge, and the sharing of images play an essential role and where processes of reciprocal validation occur." In Winance's view [8], "Autonomy does not mean an absence of connections; quite the contrary. An autonomous person is not a person who decides and acts alone, but one whose decision-making power and capacity for action are supported by multiple relationships (social, technical, institutional, symbolic, etc.)." Autonomy and discretionary tasks [9] are a useful theoretical support for us concerning the participants with disabilities (reliance or non-reliance on technologies, on other travellers, on transport personnel; reliance that is intentional, voluntary or required by the situation) and concerning the personnel (invisible

activity, invisible responsibility, objectives, responsibilities squeezed into short time periods, prioritisation, skills, etc.).

In more psychological approaches, the importance of whether a person is introverted or extroverted is observed. For example, it leads to different strategic attitudes (attempting to do everything without asking anyone for help – autonomously; or seeking out a single person who will perform all the tasks the disabled person cannot; or seeking out or taking occasional advantage of timely assistance from different people throughout these actions).

Another angle of behavioural analysis is coping [10] (i.e. the capacity to manage stress). In the situations that concern us here, stress comes from time constraints (train schedules or time available for connections), unforeseen situations that require changing itineraries, or places or periods where few people are present (terminuses, earliest and latest times on the schedule, small stations, stations without personnel, unmarked or moved bus stops). Although a journey appears to be a succession of mini-journeys, behaviours can also be considered from the perspective of resilience [11], which allows identification of strategies, contexts and support factors; that is the ability to continue one's journey despite dangers, risks, unfortunate or unexpected events, or persistent difficulties. Moving from psychology to sociology, analysis of situations and interactions has allowed some sociologists who study marginal populations, including disabled people, to describe in detail the play of interactions in situations and to point out the effects of minor discrepancies between how the person helping views the person being helped and the kind of assistance needed, and what the person being helped believes the assistance should be; and more generally, the assistance or the general attitude of the person helping, or the effects or projections, realistic or mistaken, that people without disabilities have of disabled people (whether or not they have the capacity to do certain things, etc.). The work of Goffman [12] [13], though old, is still very relevant today.

Although much research has been done on the needs of people travelling by new transport modes (bicycle, car-sharing, etc.), that dealing with travellers using so-called classic transport modes has been carried out mainly by transport operators or transport authorities. We have, however, used two models employed by these operators in our study: the behaviour typology model of Juguet and Chevrier [14] and the needs model of Uzan [4]. These two models are summarised in Table 1 (Juguet and Chevrier) and Table 2 (SOLID).

Traveller	Characteristics
Spider	Prepares and takes along all his tools (maps, timetables, and smartphone apps (transport information, maps, localisation, etc.) to be autonomous and in control during his journey
Fox	Has thorough knowledge of his transport networks and how to use them, and optimises his travel in all circumstances
Dolphin	Being adventuresome, he sets off with nothing, telling himself he will always know how to deal with the situations he encounters
Mole	Is always more or less lost despite the information available to him (signs, maps, smartphone) and asks other people, including transport personnel, for help

Table 1. Typology of traveller behaviours.

A need for...	Concrete expressions
safety	Avoid falls; avoid impacts; obey security.
guidance	Walk straight; follow a route; reach an intermediate destination; memorise and reach a final destination; come up with a substitute itinerary.
localisation	Self-localisation (where am I); halo localisation (what is around me, how is it arranged).
information	Transport information (network map, timetable, disruptions); knowledge of the environment; other communicable information.
movement	Blockage; difficulty.

Table 2. Traveller needs.

3. Objectives

This study has several objectives regarding the facts observed and the solutions to be provided. In this article we will focus on the main observations relating to behaviours, strategies, and the needs of people with disabilities as well as those of other travellers and personnel.

4. Methodology

This article comes from a study with three phases.

The first phase consisted of focus groups; the second, commented journeys; and the third, the observation of journeys we have termed "subjective", during which the participants are equipped

with a GoPro camera. The study is still in progress, which is why in this article we will discuss only the work in phase 1, which has been completed. The findings discussed here are taken from the report on this phase. We conducted five focus groups (cf. Tables 3 and 4), which we have summarised, and a group interview with educators-preparers who work with people who have intellectual disabilities.

Group	Number	Sex	Age	Disability
BVIP	15	8m 7w	23-68 Avg. 39.5	11 cane 2 dog 2 impaired
PID	12	6m 6w	18-65 Avg. 33.7	5 illiterate
PWD	16	5m 11w	20-61 Avg. 39.6	/
SNCF personnel	5	4m 1w	/	/
Public transport personnel	6	5m 1w	/	/
Educators	5	3m 2w	/	/

Table 3. Description of the groups.

Group	Duration
BVIP	2:13:34
PID	2:03:16
PWD	2:25:04
SNCF employees	2:39:06
Public transport employees	2:49:30
Educators	1:03:11

Table 4. Focus groups duration.

The same themes and scope were covered by the leaders of all the focus groups : preparation, door-to-door, transport modes, travel strategies, connections, installations, disability services, choice of helper, autonomy vs. asking for assistance, images of persons with reduced mobility (PRM), assistance from other travellers, disruptions-complex situations, full assistance for PRM, technology, tools and equipment, crowd effects, personnel status effects. However, the focus group leaders approached these themes in different ways. The reason was that for each category of participants there were specific issues about which we encouraged discussion and/or to which we attributed greater importance to obtain the most precise or detailed answers possible:

- for the blind or visually impaired, asking for assistance from anyone available depending on how introverted they are; their annoyance with "invasive" offers of help; and the feeling of abandonment on getting off a train;
- for the participants with intellectual disabilities, preparing for a journey by making it beforehand or the difficulties of creating good visual guideposts for a journey when it must be made in the opposite direction, for example;
- for people without disabilities, collective moral attitudes and individual reticence, or the misunderstanding of, knowledge about, or image of certain disabilities, etc.
- for transport personnel, the relative burden that a particular disability may represent, for example, or dividing time between assistance and their other duties, etc.

The data were first assembled in the format of Table 5, which provides an example of the data collection.

Theme	Verbatim	Reformulation	Group attitude	Observation	Proposal
...	...	...	...	...	...

Table 5. Focus group analysis model.

Each proposal for a theme was ranked (group attitude) to indicate the group dynamics. The ranking contained four levels: unanimous ++, consensus, disagreement, exceptional. The themes were then analysed, and behaviours were summarised on the basis of these analyses. Some of the essential elements of this summary are presented here. Theme sheets were also created that include the proposals, which we will not discuss here to respect the confidentiality of the work.
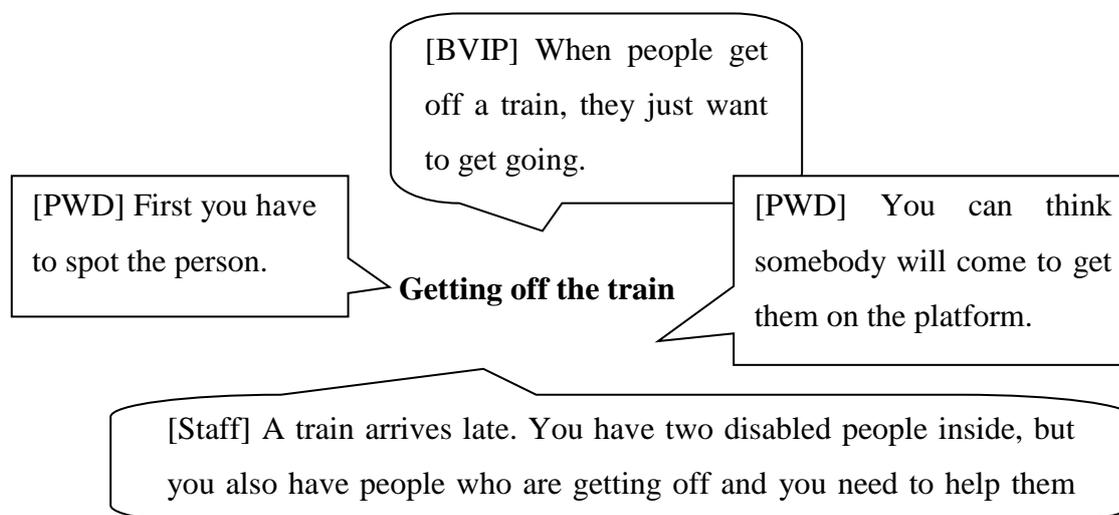
[BVIP] When people get off a train, they just want to get going.

[PWD] First you have to spot the person.

[PWD] You can think somebody will come to get them on the platform.

Getting off the train

[Staff] A train arrives late. You have two disabled people inside, but you also have people who are getting off and you need to help them

Fig. 1. Verbatim comments from three focus groups on the theme "getting off the train".

5. Findings: convergences and divergences of needs

For people with disabilities, and regardless of the disability, high noise levels and the brouhaha in stations are especially perturbing. They prevent people with visual deficiencies from determining where they are and overload the minds of those with cognitive deficiencies. For both groups, a screen of noise is created that interferes with both the acquisition of information and the possibility of communicating with other travellers or personnel. Large crowds are also disturbing to both groups, though for the blind, the impact is reduced by the Moses effect (i.e. people move away from them). These two groups of disabled people use technologies mainly in the preparation phase of a journey, and it consists primarily in consulting transport operators' websites or, in the case of Paris, the Metro Connexion website. Whether the journey is memorised (BVIP), written on a piece of paper, or recorded on a smartphone or dictaphone (less common), the idea is for them to have a roadmap they can refer to for reassurance. Any disruptions due to incidents in stations or on the tracks are experienced as a break in the planned itinerary that will require assistance from another person. For blind people, it is easier to ask for help from someone around them, i.e. other travellers or staff. When people with intellectual disabilities seek help, telephoning is the preferred choice, with the first call made to people they are close to (family, educators, etc.). If no one can be reached, they might then turn to another traveller or staff member.

The apps offered by transport operators are never in fact used by the groups of disabled people during journeys. People without disabilities (though not all) are more likely to do so. Although smartphone apps are rarely used, the idea of robot-guides in stations aroused curiosity and interest in all the groups. Also, technologies for contacting and controlling them would facilitate the synchronisation and management of "queues" for the personnel, who sometimes have

too many requests to help disabled passengers within a very short time period. Everyone mentions that human interaction is needed to provide reassurance. Stations where no personnel are present obviously create anxiety because of the difficulty of being reassured, the feeling of uncertainty, and the risk of being lost, which is temporary, of course, but always stressful.

People with visual impairments are totally unfamiliar with the commercial, cultural and social activities being developed in stations along the lines of models from Japan. They regard these facilities as reserved strictly for transport, even if these activities may be of interest to them. The BVIP lack serendipitous[i] information so they are not informed through simple contact with the new objects, services or shops of their existence and/or operation. For people with intellectual disabilities, stations are primarily synonymous with transport, and the parallel activities are perturbing to them. For people with visual or intellectual disabilities, preparing a journey is essential, either because making it without preparation is unimaginable (intellectual disability) or because it is important to greatly reduce the level of stress during the journey (intellectual and visual disabilities). In the case of people with visual disabilities, whether they are introverted or extroverted has a significant impact on their capacity for adaptation and thus for projection during a journey, and in particular on their ability to ask for help in their immediate environment (a request addressed to people in general or to a particular individual). In relation to the Juguet and Chevrier model, extroverts can behave like "dolphins", even if on the inside, their blindness puts them in the situation of a "mole". For people with an intellectual disability, the memory called upon is essentially an episodic or procedural memory that assumes the itinerary is not a journey traced out on a map, but a succession of stages in which certain sensory elements (sight, hearing, smell, or touch) enable these individuals to identify which stage they are in. Obtaining reassurance from another traveller is sometimes difficult, and they prefer to turn to a member of the personnel, regardless of his status, who, for the intellectually disabled participants, represents authority and order. The ticket inspector is one example. He supplies information, but more importantly, he checks passengers' tickets (people with intellectual disabilities will be uneasy sitting in a seat that does not correspond to their reservation; they will feel they are doing something wrong).

With their black glasses, white cane or guide dog, BVIP are easily identified by other passengers and personnel. An intellectual disability, however, is invisible as long as communication has not been established with the individual, and sometime even if it has, the nature of the disability is difficult to ascertain. BVIP are thus able to express a need for help more quickly, either by asking for it directly or by appearing lost. Intellectually disabled people feel contradictory inclinations: to reveal the disability to the ticket inspectors so as to receive more

assistance, but to go unnoticed by others so as not to become the target of ill-intentioned passengers.

All 16 participants without a disability admitted that they could not recognise a person with an intellectual disability. The people without a disability have adopted a moral attitude of solidarity and will offer assistance when necessary, but several of them emphasised that it was important for transport operators to make specific kinds of assistance "normal" out of fairness to everyone, so that their gestures of solidarity would be limited to unusual or troubling situations. When discussion turned to the possibilities for offering concrete assistance, a full range of attitudes emerged, and there was often debate over the problems of providing help. Depending on the nature of the disability and the difficulties of communication related to it, people without disabilities consider that knowledge of disabilities and how to manage situations that can result from them during a journey are prior conditions for providing continual assistance during the various stages of a long journey.

We identified several categories of behaviour in the offering of assistance:

- Behaviour motivated by safety concerns (acting to protect a person from a danger or risk)
- Behaviour motivated by kindness/pity (acting to obtain moral satisfaction)
- Behaviour motivated by compassion (acting when a person seems lost or in difficulty)
- Behaviour motivated by a "judgement call" (acting without knowing whether the person needs help or not)
- Behaviour motivated by self-interest (acting to earn moral dividends or in relation to other people, friends or family).

In the focus group, all these behaviours were mentioned, but it seems that help is offered mainly as an unselfish act or in response to a request. However, every potential situation or explicit request for help will not necessarily elicit a response from the participants. All the participants felt more or less justified or comfortable providing assistance, depending on the type of disability encountered. This feeling stemmed from a sense of empathy, projection, an experience with someone close to them, or seeing oneself in the past or future reflected in the person needing help (someone in a wheelchair, an elderly person, etc.). On the other hand, negative experiences in the past can prompt a refusal of assistance.

Besides morality, empathy and voluntarism, everyone mentioned their own stress related to the time when they had to catch their train as an important factor. This stress inhibits the offering

of assistance. Participants also mentioned the need to have the right skills and knowledge of the disability, whether acquired through training or personal experience (family or professional).

As for SNCF personnel who assist passengers with disabilities in the "Accès Plus" service, they must deal with peaks in their workload when trains and buses arrive and depart as well as with the equipment that is supposed to facilitate this service. The nature of the disability and the degree of autonomy of the people they are waiting for or they must look for are important criteria in evaluating:

- the time that will have to be allotted to each passenger;
- the possibility of relying on their autonomy when too many people need assistance;
- and the need to assist only one passenger at a time.

Train personnel say that among the various disabilities, the three categories of passengers that require the most attention are, in descending order:

- Passengers with intellectual disabilities (difficulty remaining alone and/or watching out for themselves, safety, guidance, and localisation)
- Passengers in a wheelchair (difficulty with physical access, mobile equipment or assistance from several staff members is required)
- Blind travellers (safety, guidance, and localisation)

Personnel regularly feel a conflict between the desire, out of a sense of moral or social responsibility, to accompany disabled travellers to the most convenient place for them (bus stop, taxi stand) and legal restrictions on where they may work (the station premises). Feeling a sense of responsibility for safety, they find it hard to be unable to fully satisfy the requests of these travellers because their job stops at the doors of the station or the transport vehicle. Moreover, the conditions for providing most kinds of assistance to disabled people include making a prior request, sometimes as much as 48 hours in advance.

This process is ill suited to one-off or spontaneous journeys, but well adapted to travel on trains requiring a reservation (TGV). Visually impaired travellers, for example, often rely on the assistance for disabled people without requesting it in advance. They do this because it is accepted by the personnel, who consider that people with a visual disability, even if they absolutely need to be accompanied, do not require their continual presence. On the other hand, in an identical situation, a request for assistance from a traveller with an intellectual disability or from someone in a wheelchair would be considered a burden.

Personnel who want to offer quality service and satisfy all requests provide the additional assistance in these instances without its being counted or entered on their work schedule. Some of their work is thus invisible to the company that employs them. Although BVIP find it convenient to rely on the personnel performing the SNCF "Accès Plus" service to guide them, help them manage their stress, or assist them with their baggage, these personnel sometimes feel they are viewed more as porters than as guides, a role they take seriously and make an effort to perform well. Often they juggle multiple tasks, helping one or more disabled passengers, handling their baggage (sometimes heavy and bulky), and moving the equipment needed to assist them (e.g. the battery for the wheelchair elevator platform, all at the same time. It is not always an easy job.

In small stations, the personnel are limited and they are obliged to be more versatile. They perform a large variety of tasks: receiving travellers who arrive at the station, supplying information, assisting disabled people, preparing the track, announcing train departures, and so on.

When BVIP get off a train or bus, they do not necessarily know which direction they should go. If they have requested a guide, a long wait for him or her can lead to stress. Sometimes, however, the guide must meet several people arriving on the same train or bus and must therefore manage a virtual queue.

While many architects envision movement as continuous through large, perceptually homogeneous spaces (floor surfacings feel the same, pastel colours look the same, even the signage is uniform), BVIP and PID rely on varying sensory perceptions to determine where they are, to guide them, and to find reassurance. The illuminated green cross on pharmacies, the non-slip flooring in lobbies, turnstiles, and motor noise are implicitly indicators of location and direction that are sometimes more effective than explicit signage.

Large multimodal hubs like the Paris train stations and stopping points where no personnel are present are the two most stressful and difficult connection locations for BVIP and PID. People with disabilities explicitly cite "human presence" as the primary requirement whenever the notion of a "welcoming station" is discussed, while the perceptual atmosphere and availability of information rank highest for PWD. Thus, BVIP mention "personnel present" and "not just machines", and PID, "meet a person" and "presence of someone who meets you". PID also fear seemingly chaotic situations, while the opposite – perceived calm, well-ordered installations, messages and times respected, and cleanliness – is viewed as positive, protective, and a guard against chaos.

Inspired by a universal design approach, this "fundamental" study provides detailed and in-depth knowledge that will contribute concretely to action in two fields important to SNCF:

- The creation of services to afford people autonomy by using their capabilities and the environment or by introducing new tools (digital, for example)
- The creation of services to offer human assistance when necessary

Acknowledgements

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[i] Serendipitous: information acquired either without being aware of it or from one's environment without having to look for it.