

Direct Combination: supporting diverse viewpoints and dynamic personalisation

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Abstract

This paper assumes the reader has read TR2002/1.

1 Supporting diverse viewpoints and dynamic personalisation

When Direct Combination is applied in mobile and ubiquitous settings, it affords some interesting new opportunities for users and designers. One such opportunity is to support *diverse viewpoints* (other possible terms might include *alternative worldviews*, *alternative perspective*, *dynamic personalisation* and *divergent ontologies*). When designing Direct Combination systems, there is flexibility in deciding precisely what set of operations should apply to what collection of selected objects. This flexibility, far from being a drawback, can be positively exploited to offer new kinds of dynamic personalisation and support for diverse viewpoints, by means we describe in this paper. One of the key aims of Direct Combination is to reduce search. In everyday life, it is a common experience to choose between diverse viewpoints as a means of reducing search. For example, people often choose newspapers or magazines that reflect more or less well-known viewpoints, with the effect of reducing the search required to find relevant information. In the case of Direct Combination, recall that in order to afford unfamiliar commands, a user may zap zero or more items, and then select or modify a command from the choices presented. This set of steps presents a surprising number of simple opportunities, if desired, for the user to benefit from choose amongst viewpoints. Such choice can have the effect of focussing even more tightly the already reduced search space afforded by Direct Combination. In order to understand where these opportunities to express viewpoints arise, we will itemise the points in a Direct Combination interaction at which a user could choose to express a viewpoint without undue burden on the simplicity of the interaction.

1.1 Competing views of object identity.

People sometimes hold differing views on the *identity* of an object, or its *class*, or even whether a particular object *exists* or not, and where the *boundaries* between one object and the next object lie. Such different viewpoints are commonplace among, for example, different social, religious, national and professional groups, and among those playing different temporary work roles. For example a firefighter, a policeman, a paramedic, a tourist, a child, and people of different religions might identify the same object in quite different ways - as a potential fire-risk, a possible security breach, a health risk, a tourist attraction, a toy or as a religiously significant item.

We can imagine people belonging to different groups, or playing different temporary roles choosing to set the preferences on their wands to prefer different sets of object identity servers (i.e. object directories) to accommodate and reflect such differences. Such preferences could be used for the duration of a role, or for the duration of a single interaction. For example, groups such as policemen, emergency workers, teachers, health workers, maintenance workers, travellers, paid up members of the Consumers Associations or members of the AAA (in the UK the AA) might have wands that afforded access to particular sets of professionally maintained object identity directories. The business of expressing a preference of this sort might be carried out by choosing from a list on a wand, or some preferences might automatically go with dedicated, job-related wands. More ambitiously, multiple preferences might be merged.

Scenario 1.1

"Oh dear, the car has broken down. Better set the AAA directory (or the AA in the UK) on my wand. and have a look at the engine. I hope our subscription is up to date."

Scenario 1.2

"How do I {reprogram this central heating system in the spare room, switch off the power to this wing of the house, switch off the water to the second floor}? Better set the Readers Digest Home Maintenance directory on the wand."

Scenario 1.3

" How do I, a traveller, {buy a ticket at Ulan Bator railway station, change money, find accomodation}? Better set the Rough Guide directory on my wand."

Scenario 1.4

"How do I get this door open? I wish a I had a security guard's wand (and the biometric data to make it work)."

In everyday life, expressing a viewpoint by choosing among different directories of objects is a fairly familiar experience. In the case of Direct Combination, this could be done unobtrusively and simply by setting a preference for a particular object directory on a wand. However, other possibilities exist, some a little more visually messy. For example in some environments it might be desirable to have *more than one* scannable tag on some objects, each differentiated by its own different logo. Different views of object identity, object class, or object boundary might then be expressed by the user by choosing which logo to scan. There is a trade-off here: on the one hand, a proliferation of logos has the possible benefit of exporting the choice of viewpoint from the user interface to the environment, allowing the user to focus on the environment. On the other hand, the visual clutter of that environment would be increased. Augmented reality environments using might be able to get the best of both worlds. We will now leave the topic of competing views of object identity, object class, and object boundary and consider other ways in which differences in viewpoint can be accomodated in Direct Combination. In particular we will now turn our attention to the use of different *DC brokers*, or equivalently, different viewpoints within a given DC broker. Note that, although in practice it might be most practical for a user to use a single blanket preference to affect all of the different aspects of choice at once, it is still worth itemising where the distinct opportunities exist for viewpoints to influence how DC gestures are interpreted.

1.2 Diverse DC Brokers to represent different viewpoints

Different DC brokers representing different viewpoints might reasonably be maintained by different organisations. Many organisations already have huge and well maintained databases of objects of interest to particular groups of people; for example in the UK, 'Which' Magazine, the Consumer Association, The Police association, The AA, B&Q, The Hitch Hikers Guide, The Times Higher Ed, The Guardian, EPSRC, The AUT and many others. Many business and standards organisations strive to establish and publish common protocols for objects in various domains with the express aim of encouraging interoperability. There would be plenty of scope for creating brokers that adhered to common standards yet expressed different view points. Users could then choose brokers associated with relevant organisations or appropriate brands to reflect the needs of their role or the needs of the moment.

2 Value of multiple viewpoint AC to different stakeholders

Many organisations already have existing well-maintained directories and databases of objects of interest intended to cater to their members roles or interests. It is currently generally impractical for these organisations to produce specialised user interfaces for their members to use on mobile devices. However, by applying Ambient Combination to exploit the existing strength of their existing specialised databases, organisations could provide highly specialised user interactions to suit highly targetted situations and user roles to both the organisation's benefit and to the benefit of users, using no more than the relatively simple, uniform, framework provided by Ambient Combination. By such means, the following benefits could become possible for potential providers and users:

- Organisations would have the opportunity to exploit their knowledge and resources to afford usefully customised interactions for members, subscribers or the public.
- For any organisation wishing to take advantage of such opportunities, because of the focusing, search-reducing effect of AC, in contrast with traditional approaches to user interface customisation, there would be no call for each organisation to laboriously design a series of customised user interfaces for the objects of interest to them. Instead, all that would be needed would be to define interactions between pairs of objects in existing databases.
- Different viewpoints under AC have a sufficiently powerful search reducing effect for users to find it worthwhile to express viewpoints associated with trusted organisations.

Once a user has identified two or more objects in the environment, and expressed a preferred viewpoint, the amount of useful knowledge that can be brought to bear to reduce search can be quite significant. The more objects that are involved, the more focused is the effect of the viewpoint - even when moving from just one object to two. Multiple viewpoint AC brokers have the capacity reduce search to a marked degree.

3 Other Issues

3.1 Analogy with world wide web searches

The AC infrastructure, and the benefits to users and providers are very loosely analogous to those of the world wide web. In the case of the web, users type two or three words or phrases into a search engine, which then returns several pages literally containing the

collection of phrases. Users select among these pages as they see fit. In the case of Ambient Combination, the user zaps one or more objects, and is then returned several options of operations that can be performed on that collection of objects. If there are too many options, the number of brokers to be searched can be reduced by specifying geographical constraints on brokers, or by using preferences to specify a collection of trusted organisations representing relevant viewpoints.

3.2 Bandwidth requirements

Bandwidth requirements can be reduced by such techniques as single AC brokers that cover multiple view points (Gedenryd), and by suitable cacheing (as with the WWW).

3.3 Standard Domain Object Models

Identity servers and DC servers should, wherever possible ensure that objects conform to standard interfaces & protocols, at suitable levels of abstraction to allow them to interoperate as widely as possible while offering different viewpoints.

References

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