The use of computer resources to help match people to occupations is an art and a science. It is a science because it is based on psychological knowledge of how humans relate to occupations, how they develop over their lifespan, and how they learn. It requires knowledge of economic and sociological characteristics of occupations and computer science that permits hardware and software to perform complex operations predictably, reliably, and fast. It is an art because it requires a call to action. Occupation Sort does more than get the science right. Like a motivational speaker, it engages, is understandable, and inspires the user to act.

Occupation Sort

Counselor's Manual

intoCareers, 2014

Contents

Occupation Sort Counselor's Manual

The Science and Art of Occupation Sort

The use of a computer-based resource to help match people to occupations is both a science and an art. It is a science because it is based on psychological knowledge of how humans relate to their occupations (both on and off the job), how they develop over their lifespan, and how they learn. It requires knowledge of the economic and sociological characteristics of occupations and computer science that permits hardware and software to perform complex operations predictably, reliably, and fast. It is an art because it requires communication—specifically, a call to action. Therefore, a resource that works well must do more than just get the science right. Like a motivational speaker, it must be engaging, always understandable, and inspiring so that it results in constructive action.

Occupation Sort combines three scientific approaches. First, it incorporates psychological principles based on the research of Itamar Gati of Hebrew University. Gati developed the PIC Model for Career Decision Making: Prescreening, In-depth exploration, and Choice. This model is the basis for an Israeli web-based system called Making Better Career Decisions (MBCD). Second, Occupation Sort utilizes the thirty plus years of research used to develop the Career Information System (CIS) at the University of Oregon. It incorporates economic, sociological, and psychological research to create a useful occupational database and set of factors. Finally, it utilizes knowledge of computer science and web page design gained at both universities to create an efficient, user-friendly product.

Occupation Sort is based on the principle of finding congruence—a good fit—between a person and an occupation. This means that the person and occupation must be compared in some way. Two issues are central: *What is being compared?* and *What does the comparison process consist of?* These basic theoretical considerations underlie any occupation sort.

What Is Being Compared?

Because people and occupations are very complex, it is possible to use several approaches for comparing the two and measuring congruence. For example, one approach is to measure the similarity of the person to people already in the occupation (for example, interests that they share). Another approach is to focus solely on the skill requirements of the occupation and to measure the person's mastery of those skills or the person's aptitude for acquiring those skills. The approach used by Occupation Sort is to focus on the person's *preferences* and compare them to the likely ability of the occupation to satisfy those preferences. The assumption is that if congruence is high—that is, if the person is in an occupation with a lot of potential for satisfying his or her preferences—the person will be happy and productive.

Historically many career development resources have proceeded from a very different premise. It is useful to remember that large-scale intelligence and aptitude testing was first developed to screen military recruits and direct them toward occupations in the armed forces where they would be most capable of serving wartime needs. Career development programs now are designed to help people find occupations that satisfy their preferences and thus maximize their satisfaction.

A Complex Task

The satisfaction-of-preferences approach starts to get complex when it becomes evident that people have a very wide range of possible workplace preferences—e.g., values, interests, work conditions. Some workers seek occupations where the ideas and tasks are interesting; other workers seek values such as prestige, autonomy, or income; and still others seek work conditions such as non-sedentary tasks or an air-conditioned office. Probably most people require a combination of these types of occupational rewards to be happy, and many people (especially young people with little work experience) may not be consciously aware of what rewards they actually prefer. We all know or have heard of young people who complete a college major promising a lucrative career, only to discover that the absence of certain non-monetary rewards—such as leisure time, interesting tasks, or independence on the job—renders the work unsatisfying. Therefore people using the satisfaction-of-preferences approach need to take the time to consider a wide range of factors that may affect their career satisfaction—including possibly some latent, previously unvoiced preferences. Furthermore, they need to set priorities among these preferences, since they are unlikely to be able to satisfy every one.

For the sake of a good occupational fit, people need to consider one additional aspect of each preference: the *level* or *amount* of the characteristic that must be present in an occupation to be satisfying (for example, how much independence is sufficient). It is easy, but mistaken, to assume that with preferences more is always better. Sometimes a feature of an occupation that is pleasing in a moderate amount may be burdensome in a large amount. This is particularly true for features of the occupation that may be considered skills or abilities required to perform job tasks. For example, some people want their work to include opportunities for solving problems, but do not want the work to consist *primarily* of problem solving (a skill). Some prefer a high level of physical activity (an ability), some a low level, and some a moderate level.

In many cases, a feature of an occupation may be considered an opportunity for a reward by people who want a lot of it but may be viewed as a barrier by people who do not want a lot of it. When a feature of an occupation is perceived as a barrier, and therefore cannot be called a “reward,” the (moderate or low) level of the feature that the person desires is still a *preference*. Therefore, the satisfaction-of-preferences approach should give people the ability to specify a low *level* that must be present for their satisfaction.

The multidimensionality of the satisfaction-of-preferences approach is both a blessing and a curse. It is a blessing because the match between people and occupations is probably better when it is established on multiple dimensions, thus avoiding (for example) an occupational goal that is a good match in terms of interests but a bad match in terms of potential income or physical demands. The multi-dimensionality is a curse because it adds so much complexity to the matching process—to the required tasks of introspection to establish preferences, investigation to learn about occupational options, and matching to find where there is congruence between two sides of the equation. That is, people first must consider the many possible preferences (both conscious and latent) that they may have, including the level of the occupational characteristic that they require for satisfaction. Then they must obtain information about the ability of occupations to accommodate these preferences, including the level of potential “payoff” that each occupation offers, as well as (when the preference is a barrier) the level of potential “can-do” that the person is required to possess. Finally, people need a reasonably easy to understand technique for deciding what constitutes a match along these multiple dimensions.

What a daunting task! Even highly organized people—the kind of people who make lists—can be discouraged by the difficulty of working in several dimensions and levels while undertaking the career-choice tasks of introspection, occupational research, and matching. They need help with these tasks, but self-help books rarely are able to handle multiple dimensions elegantly, and human counselors may not have the necessary time or encyclopedic knowledge of career information.

Understanding, Participation, and Freedom of Choice

The solution to this problem may seem obvious: Let a computer do the matching. Computers can handle multiple dimensions with ease. But with use of computers comes the risk that people will not *understand* or *participate in* the process that produces the output—crucial conditions for a good career choice. Understanding and participation are the necessary ingredients of an *informed* decision and go hand in hand with the principle that people should have *freedom* to choose.

Career choice is more than just knowledge; it requires a course of action, often amounting to years of effort, and therefore it depends on genuine commitment. People who understand and participate in a decision take ownership of it.

To be sure, people seeking help with career decision making often seek an easy solution. Most guidance counselors have heard the plea, “Just tell me what I should do!” Young people may be unused to making decisions for themselves and may yearn for someone or something to act in loco parentis and make a wise decision for them. But in the long run their commitment and satisfaction depend upon their understanding of the decision-making process and their being involved in it.

Occupation Sort uses a process that has been specifically designed to be *understandable* by users despite the complexity that is inherent in the multidimensional satisfaction-of-preferences approach. It is also a highly interactive process that is designed to give users a feeling of *participation* in producing the outcome. To appreciate how Occupation Sort accomplishes these goals, let’s consider the data and rules that govern its sorting process.

What Does the Comparison Process Consist of?

A computer-based occupation-sorting process based on the satisfaction-of-preferences approach has three components:

1. The *factors* that the user selects as search criteria, plus the level or range of levels within each factor the user wants, ordered by their importance to the user.
2. The *ratings* (usually numerical) by which occupations in the database are coded for each factor (i.e., what level of the factor characterizes each occupation).
3. The *algorithm* (the set of rules and procedures) that applies the user's chosen factors, performs computations based on the occupations' ratings, and produces a tailored list of occupations that are a good match.

Occupation Sort uses an algorithm based on the sequential-elimination model. In this model, the computer applies the user's selected and prioritized *factors* one at a time, comparing the user's preferences for these factors to the *ratings* of the occupations in the database. For each factor, the algorithm eliminates those occupations that do not match the user's preferences. Thus, the occupations that remain on the user's list have only the characteristics that satisfy the user's preferences, and eventually the list gets small enough to be a useful set of alternatives to consider. Because many combinations of factors can reduce the list severely, it is important that the sequence of eliminations be based on the priority of the factors for the user—i.e., the most important factor produces the first cut; the second most important factor produces the second cut; and so forth.

In Occupation Sort, users choose the factors they want to apply from an alphabetical list on the left side of the screen (see Figure 1). As they click the name of a factor, it moves to the right side of the screen. A printed worksheet is available beforehand to allow users to ponder this list of factors, see how they are defined, and take lots of time for thoughtful introspection; but users who have not seen the worksheet can see the definition of any factor by clicking the cartoon talk bubble (enclosing a question mark) that appears next to the name of each factor. The names of the factors are mostly self-explanatory. Then, if users want to adjust the priorities of the factors selected, they can move factors up or down in priority by clicking an up- or down-pointing arrow that appears next to each factor listed on the right side of the screen.

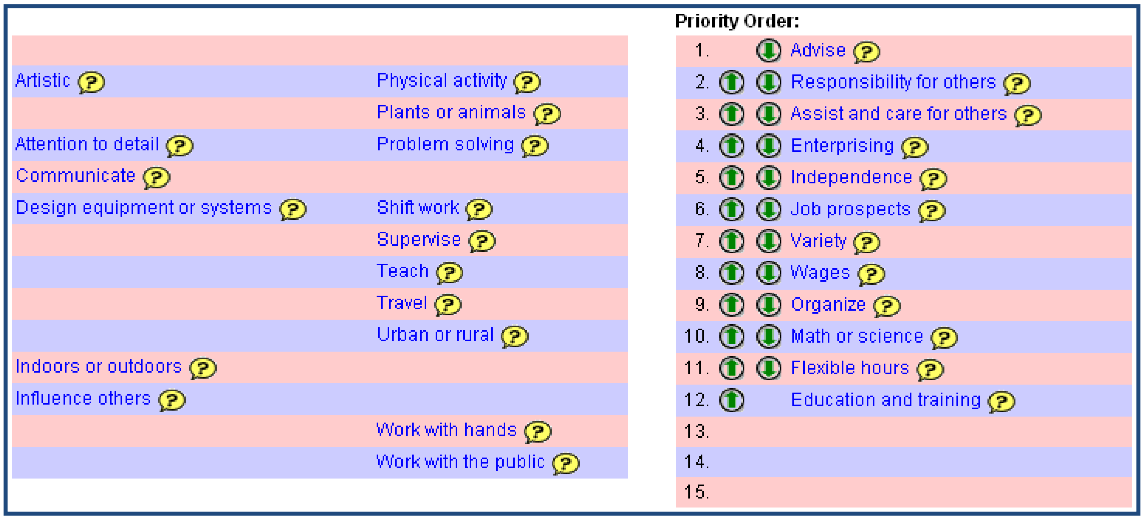

Figure 1: Choosing Factors and Setting Priorities among Them

Users who have a hard time deciding which factors are personally most important can click “Recommended List,” which causes the following 10 factors to be selected automatically, in this order:

1. *Education and training*
2. *Communicate*
3. *Math or science*
4. *Indoors or outdoors*
5. *Physical activity*
6. *Problem solving*
7. *Independence*
8. *Wages*
9. *Artistic*
10. *Organize*

These factors were identified by career development professionals as the factors that would have the greatest educational value for the typical user. To maximize users’ participation in the decision-making process, counselors will probably want to discourage users from defaulting to the Recommended List—or at least encourage users to manipulate the list, adding or subtracting factors and reordering them.

Following the sequential-elimination model, Occupation Sort applies the chosen factors one at a time to the set of occupations, according to the priority of each factor. Before each factor is applied, users specify what level(s) of the factor they prefer in their work (more detail on this below). Users can continue the sequential elimination process until all the chosen factors have been applied, at which time the list of remaining occupations is displayed. Users also can view the list at any time, although it makes most sense to wait until the the set of remaining occupations has reached a reasonably small number. If the application of a certain factor empties the list, users are advised to *adjust* the factor by specifying different level(s) and thus produce a less drastic impact.

Benefits of the Sequential-Elimination Model

The greatest benefit of the sequential-elimination model is that users understand how it works and are involved in it. Because they get instant feedback for each factor they apply, they understand that *what they ask for* determines *what they get* on their list. Occupation Sort uses a combination of numbers and colorful bar graphs (see the bottom half of Figure 2) to convey this feedback. The display shows not only the cumulative size of the list (the occupations "Not On Your List" and "On Your List"), but also the marginal significance of each factor ("Eliminated by Last Choice"). The use of color for these bars—green for "On Your List," red for "Not On Your List," and yellow for "Eliminated by Last Choice"—communicates intuitively. The interface also permits users to modify what they asked for and instantly see the effect on the size of the list: Users merely need to click their modified preferences in the upper half of the screen, then the Sort icon, and the results change appropriately. Finally, the program provides a warning if a selection will have a drastic impact on the list: "This choice eliminated *X*% of the occupations previously on your list. Make sure you feel strongly about this decision before proceeding." Users may click "OK" to proceed or "Cancel" if they have changed their mind in response to the warning. All of these features of the program are designed to ensure that users buy into the results of the sorting process because they understand how it works and feel in control of it.

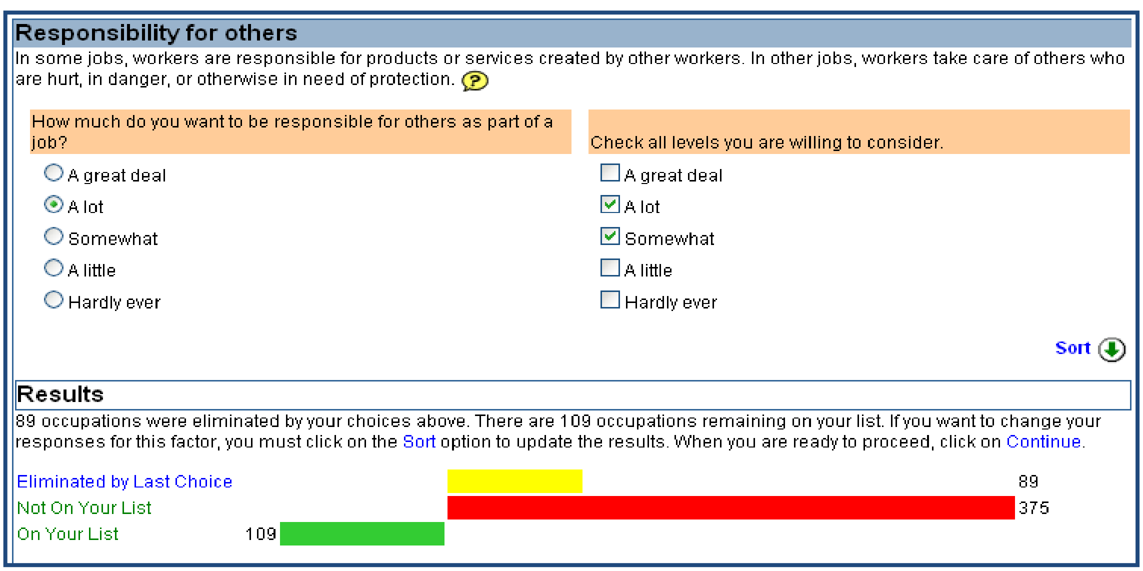

Figure 2: Choosing Level(s) of Satisfaction and Seeing Results

Another benefit of the sequential-elimination model is that it represents a popular way for making decisions, especially in matters that involve a lot of options and factors to consider. Many, perhaps most, people making such a choice tend to think in terms of certain nonnegotiable requirements and eliminate options that do not meet these requirements. ("Any car I buy must have a sunroof." "I never stay at a hotel room that's near the elevators." "I don't want a dog that sheds all the time.")

In the sequential-elimination model, because users apply the factors one at a time, they are forced to set priorities, which are reflected on the printout and become a useful topic of further thought and discussion. A guidance counselor, a parent, or a friend may ask, for example, "Why did you ask for *Artistic* before *Math or science*?"

In this model, users focus on the factors that are most important to them. This saves them time in the selection process. (Contrast this to an inventory with pages and pages of questions.) In fact, they can choose just *one* factor and later add more to pare down the list further. The particular mix of factors that are available for use in Occupation Sort is based on research done by the Oregon Survey Research Laboratory—a combination of literature review, surveying of counselors, and surveying of high school students. When students' preferences had high intercorrelation coefficients (for example, "mathematics" and "science"), the preferences were collapsed into one factor (in this case, *Math or science*). A few factors identified in the surveys (e.g., "advancement opportunities") could not be used because it was difficult to find reliable and consistent sources for rating occupations.

Importance of Specifying Levels

Users sometimes wonder why Occupation Sort requires the extra step of specifying the *level(s)* of the factor that they prefer (see the top half of Figure 2), after they have already selected and prioritized the factor. Why can't the algorithm simply eliminate occupations that "do not have" the factor?

We have already seen that the level of a factor is important for a good match, particularly when that factor may be viewed as a skill, ability, or other requirement. This is easy to see if we consider the factor *Education and training.* This requirement for an occupation is obviously something that the occupation does not "have". It is something that an occupation *requires at a particular level* (sometimes permitting more than one). Also, it would be a mistake to assume that for this factor "more is better" because education and training require an investment of time, money, and effort that many people want to minimize. Likewise, it would be a mistake to assume conversely that "less is better" because on the whole occupations requiring less education and training have lower payoffs of wages, prestige, and other rewards, so people often want to rule out occupations with low requirements for education and training. Therefore, CIS Occupation Sort offers users the following five options: "5 or more years," "4 years," "2 to 3 years," "4 months to a 1 year," or "A few hours to 3 months."

Some factors offer a range that is labeled in bipolar terms. For example, with the factor *Indoors or outdoors,* users select their level of preference on a continuum ranging from "Always outdoors" to "Always indoors."

The use of a bipolar continuum allows Occupation Sort to include factors that can be regarded either as opportunities or barriers. In Occupation Sort, users who regard *Math or science* as an interest that they want to pursue may ask for "A great deal," whereas users who regard *Math or science* as an ability they lack or a skill that they have not mastered may ask for "Hardly ever." (Of course, they also may choose some level between these extremes.)

Although many factors are described on a bipolar continuum, two factors—*Job prospects* and *Wages*—are programmed to assume that for most users more is better. If, for example, a user selects *Job prospects* and then chooses a level (say, "Very good"), that level and *all* levels above it automatically receive check marks and this heading appears: "We assume you are willing to accept jobs with better prospects." The assumption is that few if any users will want to set a cap on their likelihood of being employed or their potential wages. However, if for whatever reasons users want to specify only one level of *Job prospects* or *Wages,* they can clear the extra check marks.

Recognizing Compromise and Teaching Flexibility

Matching Users and Occupations on Multiple Levels

To recapitulate: Occupation Sort is based on the principle of finding occupations that meet the user's preferences and therefore uses an algorithm that matches the user's level of preference to the level that characterizes the occupation.

But there is no reason that either of these levels needs to be single. That is, in Occupation Sort users can choose *multiple levels* of a factor that will satisfy them—a "preferred" level and one or more "acceptable" levels (as the user has done in the top half of Figure 2). Likewise, occupations are given *multiple ratings* on a factor—for example, camera operators are rated on *Artistic* at three levels: "A great deal," "A lot," and "Somewhat." ("A lot" is considered its "typical occupational level," and the other two levels are considered to be where "some jobs fall.") This flexibility is particularly useful when selecting a high level causes the list of occupations to crash to zero or a very low number; users can easily recover by specifying an additional *acceptable* level of the same factor. Thus CIS Occupation Sort facilitates the sorts of compromises that people often are willing to make in real-life decisions.

The theoretical basis of this feature of Occupation Sort is the theory of *fuzzy sets* (and its offshoot, fuzzy logic) pioneered by Lofti Zadeh of the University of California at Berkeley, which says that in real life most things do not belong 100% to one category as opposed to another. This is certainly true of occupations: For example, none belongs exclusively to the category of "high-paying occupations" as opposed to "moderate-paying occupations" because there is variation in earnings among the incumbents of the occupation.

It is possible to find a central tendency for an occupation's earnings by calculating a mean or a median figure, but doing so discards much information about the distribution of earnings. For example, consider the occupation Real Estate Agents, which is populated by a large number of recent entrants and a small number of very experienced workers. For many factors used in an occupation sort, any single rating of Real Estate Agents can do only a poor job of characterizing the diversity within this occupation. Consider the problem of assigning it a rating on income. The mean income for this occupation is 30% higher than the median income (a discrepancy higher than for almost all other occupations). Which figure is appropriate to use to represent the "typical" income? Other occupations are diverse for other reasons and in other ways. For example, one of the factors used in Occupation Sort is amount of Shift Work required. Most Registered Nurses who work in hospitals will be required to work different shifts. Registered Nurses who work in doctor's offices will normally work regular office hours. A single rating on Shift Work will not do justice to the diversity in this factor within this occupation.

Therefore, for most factors used in Occupation Sort, occupations are rated not only for a "typical occupation level" but also for other levels where "some jobs fall." (In the language of fuzzy set theory, the occupations participate in multiple categories.) The ratings are based primarily on the O*NET database, together with the judgments of trained analysts. Each factor for each occupation is coded by five analysts, who first work independently and then meet to reconcile any differences in their judgments.

Just as occupations may be described as having fuzzy characteristics, so people's preferences are usually fuzzy—that is, people rarely are inflexible about what they demand, especially when they learn that being too narrow with their demands drastically limits their options. In the terms of Occupation Sort, people tend to have not only a "preferred level" of satisfaction for any one factor, but also "acceptable levels."

In Occupation Sort fuzzy matching of people to occupations is designed to work in a way that users can *understand* and *participate in*. When users are asked to enter their preferences for a factor in Occupation Sort, the computer not only asks what level they prefer (i.e., which one from a column of option buttons), but also presents them with a column of checkboxes and asks them to "Check all levels you are willing to consider" (as depicted in the upper half of Figure 2). The sort routine then checks to make sure that the range of levels chosen overlaps with the initial single level chosen. Thus, for example, if a user initially clicks "A lot" but then chooses only "A great deal" as an acceptable level, the sort routine automatically fills in the checkbox for "A lot" so the two selections overlap.

Once users are looking at their list of occupations, they can click any occupation and see how its characteristics match the users' preferences. The graphic that illustrates this, shown partially in Figure 3, communicates how the expressed preferences and the occupational characteristics match. For a factor chosen, a dark blue zone indicates "your preferred level"; for the occupation from the list, dark blue indicates the "typical occupation level" at which the occupation is rated. A lighter blue zone indicates "your acceptable level" for a factor; for the occupation, it indicates a level where "some jobs [in this occupation] fall." So, in the example illustrated in Figure 3, the "typical occupational level" of *Advise* for the occupation Chiropractors ("Somewhat") does not exactly match the user's preferred level for that factor ("A lot"). Nevertheless, the occupation remains on the list because the user is also willing to accept the "Somewhat" level. Of course, if the user had asked for "A great deal" of *Advise* and no other level, there would have been no overlap between the user's choice and the occupation. Thus, even though the algorithm permits fuzzy matches, every factor still has potential veto power.

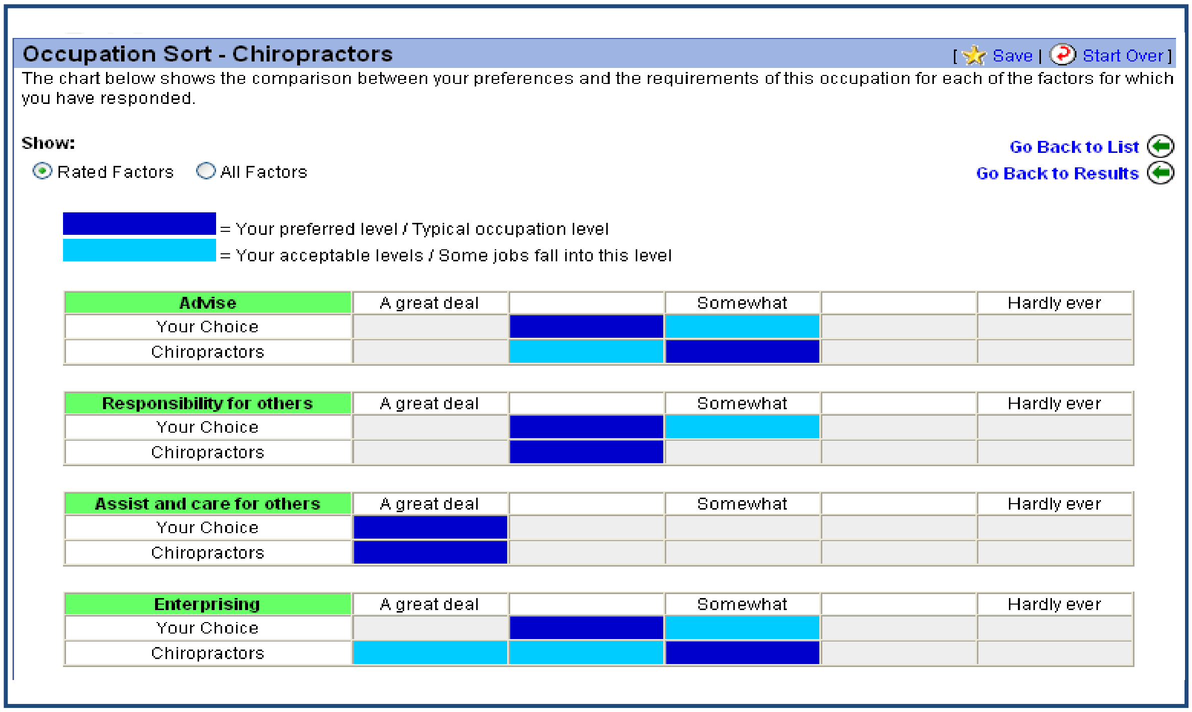

Figure 3: Seeing How the Occupation Matches the Levels of Each Factor Chosen

Verifying the Appropriateness of the List

One possible argument *against* the sequential-elimination model is that it is dangerous to give veto power to any one factor because users will eliminate occupations without being fully aware of what they have lost—they will be unaware of the identities of the occupations they have lost and unaware of advantages of those occupations that may compensate for their disadvantages.

For example, consider how users might apply the factor *Education and training*. The risk is that users who aspire to a low level of education and specify a level such as “A few hours to 3 months” may not appreciate the occupational options they are ruling out, other than in purely numerical terms. That is, after applying this factor they can easily observe *how many* occupations have been pared from their list, but they may not take the trouble to note *what kinds* of occupations would have been open to them had they specified a higher level of education. Usually we want to encourage greater educational aspiration, so isn’t it a problem if we allow high-education occupations to fall by the wayside so easily?

Actually, Occupation Sort tempers veto power in several ways. To begin with, it is extremely easy for users to see which occupations have been removed by each factor that is applied. They merely need to click “Eliminated by Last Choice” (or the yellow bar that represents the number of occupations just removed) to see the list of those occupations. Next to each occupation is a button with the label “Why Not,” and clicking the button reveals a graphic (see

Figure 4) that explains why the occupation has been removed from the list. Like the graphic in Figure 3, this graphic uses dark blue and light blue zones to communicate the multiple levels of the user's choice and the occupation's ratings. The user can easily see how the two fail to overlap and what amount of compromise would be necessary to retain this occupation on the list. In Figure 4 Accountants and Auditors would remain on the user's list if the user were willing to add "4 Years" as an acceptable level of *Education and training*.

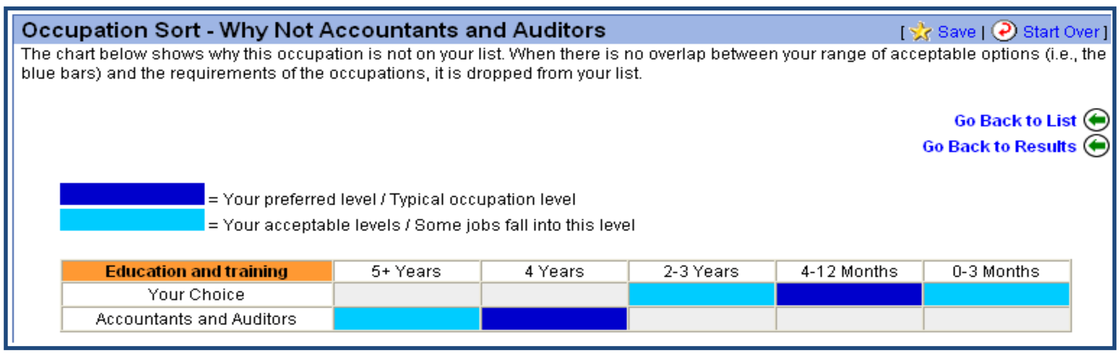

Figure 4: The "Why Not" Capability as an Example of Fuzzy Matching

Users who want to know "Why Not" at a later time—not immediately after the factor has been used—can click "Not On Your List" (or the red bar that represents the total number of occupations removed so far) to see a complete listing of those removed occupations, each with a "Why Not" button. Finally, when users are perusing the list of occupations remaining, they still can view the eliminated occupations and choose to see "Why Not" for any one. This capability makes the sorting process explicit and therefore contributes to the users' buy-in of the results. It also reminds users that they are participants in the sorting process because they can change the output at any time by compromising on the specifications they input.

Occupation Sort provides an additional function to temper veto power and help users recognize when flexibility might expand their options: If one or more occupations have been eliminated because of *only one factor* AND the *user's choice and the occupation's ratings are touching but not overlapping*, users can ask to see "Occupations Almost On Your List." Again, each occupation has a "Why Not" button, and clicking this button produces a graphic similar to Figure 4 (i.e., with touching but non-overlapping blue zones), showing what compromise would be necessary on this factor to retain this occupation on the list. Users thus learn that they can expand their opportunities by being more flexible—for example, by undertaking more *Education and training* than they had previously specified.

The opportunities for flexibility within Occupation Sort make good on a basic premise of the system: Conducting a sequential-elimination, multidimensional occupation sort with feedback loops is a *learning experience*. Users react to the results, can modify their input to produce new results, and as they learn how the process works, they also learn about themselves as well as about occupations. As they see and react to the results of their preferences, users with very high expectations for satisfaction may become more realistic; users with very low expectations may learn to raise their aspirations. Users are kept highly *engaged*, which is the best way to learn something, as opposed to being a passive consumer.

Because some users can spend a fair amount of time in Occupation Sort experimenting with various combinations of factors and levels, it is important for users to create a "My CIS" portfolio before they begin the Occupation Sort. This allows users to view their results at any time and use them to explore occupations further. It also allows users who do not complete Occupation Sort in one sitting to retain their answers so they can complete the process at another time, without having to start over.

Narrowing the List, Moving toward Choice

Occupation Sort provides feedback designed to encourage users to shape their list of occupations to a reasonable size. If the list has not reached zero after the last factor has been applied, a Recommendation screen appears with suggestions for what to do next. For example, if the number of occupations remaining is greater than 75, the Summary says, "There are *X* occupations remaining on your list. This is a very large number of occupations to consider. You may find it helpful to have a shorter list. Here are two ways you can reduce the number of occupations on your list." It then gives directions for applying additional factors or narrowing the acceptable range of levels for the factors that have been used already. Either of these options will reduce the size of the list.

Conversely, if the list has fewer than 10 occupations, the Recommendation notes, "There are *X* occupation(s) remaining on your list. This is a small number of occupations to consider. Here are some suggestions to help you decide what to do next." It then gives directions for examining occupations on the list in greater depth (more on this below) or using the "Why Not" capability to examine occupations that were eliminated, perhaps on the basis of only one factor. These options may encourage users to compromise on what they have specified, thus expanding the size of the list.

If the list numbers between 10 and 25, the Recommendation notes that the list is of reasonable size and it suggests that users explore the occupations in greater depth, especially occupations that are unfamiliar. (It also suggests using the "Why Not" capability to examine the characteristics of occupations of interest that did not turn up on the list.)

Exploring Occupations in Greater Depth

So far we have been looking at the ability of Occupation Sort to generate a list of *names* of occupations worth further exploration and to confirm that the aspects of those occupations meet the user-selected preferences—but this is not a sufficient outcome for making a career decision. Users ultimately expect to settle on *one* occupation as a career goal worth striving for, so they need to explore the occupations on the list in greater depth to continue the process of elimination. Perhaps further exploration will reveal that an occupation on the list has some unappealing aspect not included among the available factors—or, conversely, some highly appealing aspect—that makes it stand out from the other occupations.

Therefore Occupation Sort provides several capabilities for learning more about occupations. To begin with, a user can compare two occupations on the list in terms of their ratings on the factors selected. Figure 5 shows a partial example of the graphic that results. In this example, Appraiser and Assessors and Elementary School Teachers both meet the user's request for work that consists “Somewhat” of *Physical activity*. But a user who wants to avoid sedentary work might notice that the “typical” rating for Appraisers and Assessors on *Physical activity* is actually lower than “Somewhat”—the “Somewhat” rating applies to only “some jobs” for Appraisers and Assessors—whereas for Elementary School Teachers this moderate level of *Physical activity* is “typical.” This same user might also note that “some jobs” for Appraisers and Assessors fall all the way at the “Sitting” end of the continuum. Therefore, while both occupations are suitable in terms of the user’s specifications, Elementary School Teachers has an advantage for this somewhat energetic user. The color background for the factor name (i.e., Organize) indicates the compatibility of the two occupations: green indicates overlapping ratings, orange indicates "almost" overlapping, and red indicates non-overlapping ranges.

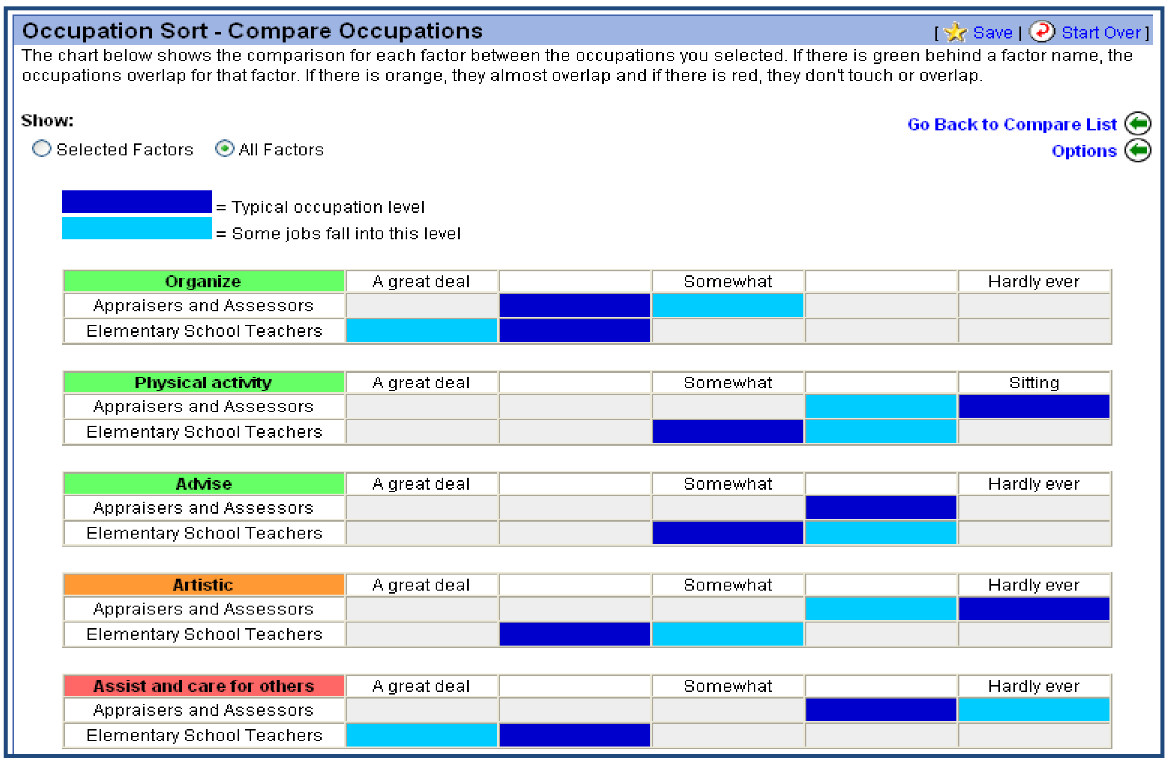

Figure 5: Comparing Two Occupations From the List

Another way to explore an occupation on the list is to ask to see how it is rated on *all* factors—not just those that the user has just applied to the occupational sort. Figure 6 shows a partial example of the output that results. It begins like Figure 3, showing how the ratings for the occupation compare to the preferences expressed by the user (i.e., how the blue zones overlap). But it also shows the blue zones for factors that the user did *not* use in the occupational sort. In this example, a user who is not very interested in working with details may note that the occupation Chiropractors typically requires “A lot" of *Attention to detail*. Although this user does not dislike details enough to have chosen to use this factor in the occupation sort, the extra piece of knowledge that the graphic communicates might count as a strike against this occupation in this user's estimation. Information about the occupation's ratings on other factors may contribute still more positive or negative impressions. Thus users have a way of considering the impact of even low-priority factors and can accomplish some of the goals of the compensatory model of sorting occupations—that is, they can bring *all* factors to bear on the selection process.

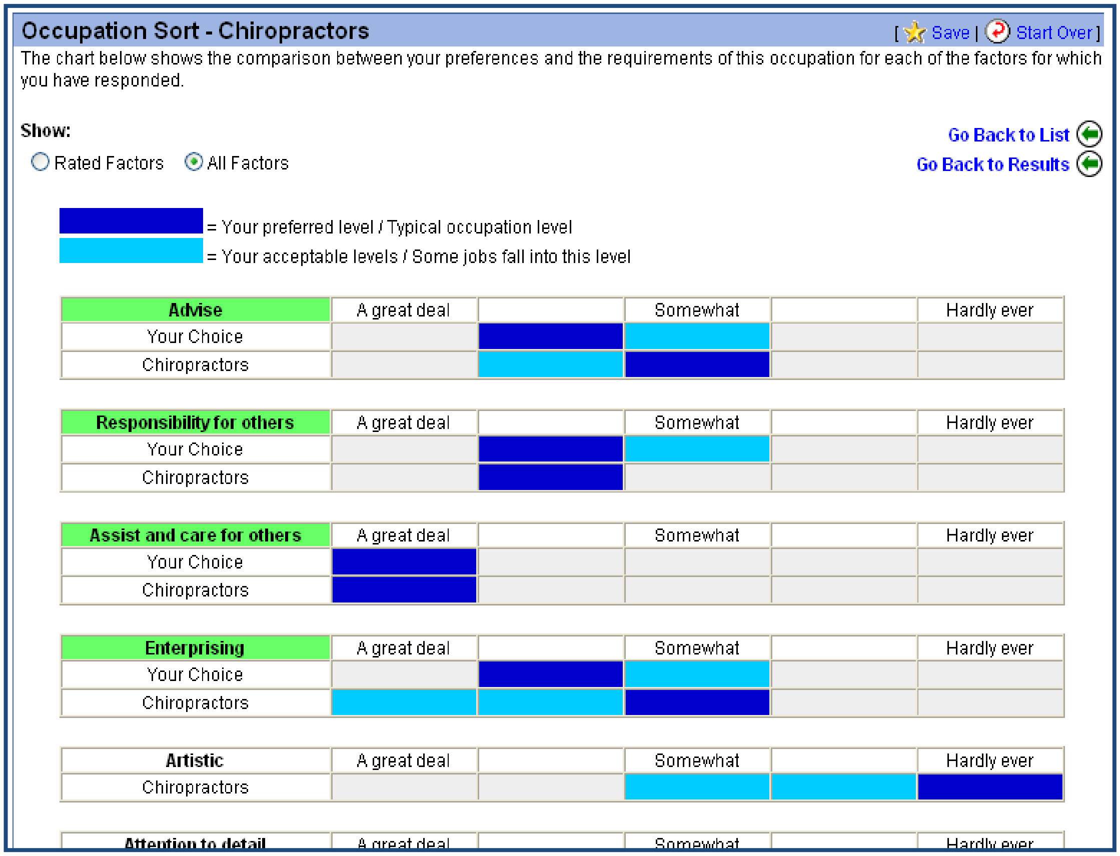

Figure 6: Viewing the Occupation's Ratings on All Factors

Finally, users can click the name of any occupation on the list to see the full database of CIS information about the occupation: overview, task list, common work activities, working conditions, physical demands, and so forth—17 topics in all including video clips, plus links to related programs of study, military occupations, self-employment information, job openings posted to Job Central, a national labor exchange (not available in all sites), and occupations that are considered similar. This rich fund of information can help users decide whether to rule out an occupation or explore it still further using other resources. And because users can do the same for any occupation *eliminated* from the list or *almost* on the list, they can consider compensatory features of those occupations that might make them worth further consideration (another capability that tempers the veto power of the sorting process).

Of course, we cannot and should not expect anyone to make a final career decision solely on the basis of information gleaned from the computer. Itamar Gati's model for career decision making identifies three stages: prescreening, in-depth exploration, and choice (hence the acronym PIC). Occupation Sort covers only the prescreening stage of the process. CIS provides information that helps at the in-depth exploration stage. Career decision makers need to explore targeted occupations in depth by also engaging in activities such as talking to workers, interviewing academics in the related fields, visiting a worksite, shadowing people on the job, taking a few classes or training sessions, talking to local employers, doing volunteer or part-time work in the field, and checking help-wanted advertisements. From what they learn, they can make the final choice between the most promising career alternatives. But Occupation Sort provides a first cut of the occupations that are likely to suit a person's preferences.

In the give-and-take interactivity of Occupation Sort, users master the task of matching their preferences to occupations on multiple levels of multiple dimensions—a task that in the abstract might seem impossibly complex. The process is easy to understand and enhanced by the use of colorful graphics. Users are highly engaged and the process accurately reflects the flexibility of people's desires and the variability within the working world (thanks to use of fuzzy set theory). Users are likely to *buy into* the results of the sort and feel a commitment to sustain the effort required to explore their occupational goal further and ultimately strive for it. Occupation Sort thus produces not only a likely good match, but also a better likelihood of follow-through.