

**Buckingham, C.D.<sup>1</sup> & Birtle, J. (1997). Representing the assessment process for psychodynamic psychotherapy within a computerized model of human classification. *The British Journal of Medical Psychology*<sup>2</sup>, 70, 1-16.**

**Abstract**

This research describes a computerised model of human classification which has been constructed to represent the process by which assessments are made for psychodynamic psychotherapy. The model assigns membership grades (MGs) to clients so that the most suitable ones have high values in the therapy category. Categories consist of a hierarchy of components, one of which, ego strength, is analysed in detail to demonstrate the way it has captured the psychotherapist's knowledge. The bottom of the hierarchy represents the measurable factors being assessed during an interview. A questionnaire was created to gather the identified information and was completed by the psychotherapist after each assessment. The results were fed into the computerised model, demonstrating a high correlation between the model MGs and the suitability ratings of the psychotherapist ( $r = 0.825$  for 24 clients). The model has successfully identified the relevant data involved in assessment and simulated the decision-making process of the expert. Its cognitive validity enables decisions to be explained which means that it has potential for therapist training and also for enhancing the referral process, with benefits in cost effectiveness as well as in the reduction of trauma to clients. An adapted version measuring client improvement would give quantitative evidence for the benefit of therapy, thereby supporting auditing and accountability.

Assessing the suitability of clients for psychodynamic psychotherapy is a complex and time-consuming task requiring the expertise of highly-qualified professionals. In training courses it is often one of the final skills to be developed because it requires both theoretical and practical knowledge of psychotherapy. Selection criteria have been proposed by a number of authors (Malan, 1963; Coltart, 1987) but for the practicing clinician there is no absolute guidance available and much of the decision about whether or not to offer a psychodynamic treatment intervention may be based on an intuitive feel for the clients and their problems (Coltart, 1993).

This research sets out with the intention of capturing the essence of the decision-making mechanism, thereby defining and clarifying both objective and the more subjective factors which lie behind the postulated intuitive judgement. One way of achieving it is by building a computerised model of the cognitive processes involved (Slatter, 1987) and this approach is described for the assessments made by a particular consultant psychotherapist. The model identifies the factors involved in the decisions and directly generates a questionnaire for gathering the necessary data.

The ultimate aim of the research is to develop an expert system which will support the judgement of the clinician in determining who will benefit from psychodynamic psychotherapy and, conversely, in identifying those who are either unlikely to benefit or may deteriorate. We would envisage it functioning as an adjunct to the clinical interview by providing a framework to aid clinical decision-making skills and forming a bridge between research and practice. In terms of this paper, the central objectives are to describe the model and the associated questionnaire, determine its validity, and show how it could be

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<sup>1</sup>Correspondence address: C.D.Buckingham, European Institute of Health and Medical Sciences, University of Surrey, Guildford, Surrey, GU2 5XH.

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used as a computer-based decision-support system. The next section outlines the basic investigative method used and is followed by a description of how the selected cognitive model represents the psychotherapist's assessment process.

## 1 Method

### 1.1 General approach

The general research approach was to interview a particular psychotherapist (JB, the second author), determine how clients are assessed for psychodynamic psychotherapy, and simulate the process with a computer model. The model's validity was tested by comparing its performance with that of the consultant psychotherapist on the data obtained from a series of clinical assessment interviews.

### 1.2 The setting

The investigative base for the research was the Uffculme Clinic in Birmingham which houses the National Health Service (NHS) Regional Psychotherapy Unit of the West Midlands. The clinic provides an adult psychotherapy service with a commitment to both patient care and to training. Approximately 700 patients are referred annually for assessment by general practitioners, physicians, psychiatrists and multiprofessional mental-health workers. The majority of the patients have severe neurosis or personality disorder; many have a history of recent or early trauma including experiences of loss or child sexual abuse. Some have a history of psychotic breakdown, drug or alcohol abuse, recurrent self harm, or serious suicide attempts. The level of distress and disturbance is high; few would be considered ideal candidates for psychodynamic psychotherapy as defined by Coltart (1987).

### 1.3 Procedure

#### 1.3.1 Interviewing the therapist

A series of semi-structured and structured interviews were conducted with the consultant psychotherapist to elicit a cognitive model of how she assesses the suitability of clients for psychodynamic psychotherapy. This model was then transformed into a computerised system.

#### 1.3.2 Questionnaire construction

By identifying the information used by the therapist during assessment, the cognitive model directly led to the construction of a questionnaire for gathering the required data after each client's interview. The final question asked for the therapist's judgement of how appropriate the client appeared to be for psychodynamic psychotherapy.

#### 1.3.3 Clinical data collection

During the research period, consecutive assessments conducted by the therapist as part of her routine clinical work were each followed by completion of the questionnaire. A total of 24 interviews were included in the analysis presented in this paper.

0 to 50 (minutes late)	Yes/No	0 to 10 (rating)	Yes/No
TIMEKEEPING	BRING ONESELF	DEGREE OF IMPORTANCE EXPRESSED	ATTENDS FIRST APPOINTMENT

Figure 1: The part of the client’s feature vector which supplies data for the commitment-to-therapy concept shown in Figure 2.

### 1.3.4 Testing the computer model

Questionnaire data from the assessment interviews were fed into the computer model which then generated its own estimate of that person’s suitability for psychodynamic psychotherapy. The suitability ratings of the therapist and the computer were analysed to determine their degree of agreement.

## 2 The galatean model of psychotherapy assessment

Classification lies at the heart of the assessment process and also plays a fundamental role in human understanding and reasoning (Smith and Medin, 1981; Van Mechelen, Hampton, Michalski, and Theuns, 1993). For these reasons, it was decided to formulate the psychotherapist’s expertise by a model of classification and, because of its cognitive validity, the specific one chosen was Buckingham’s (1992) *galatean* model. A full description of it can be found elsewhere (Buckingham, 1992); this paper will concentrate on the relevant aspects by delineating the psychotherapist’s assessment expertise in parallel with its incorporation within the galatean model.

Most cognitive models of classification (Estes, 1986) represent objects by feature vectors which are essentially a single line of pigeonholes where each compartment represents a particular descriptive attribute of the object. Figure 1 shows part of the feature vector for a client being assessed for psychodynamic psychotherapy. It contains the information leading to a judgement on how committed the client is for therapy: there are components measuring their promptness, the prioritising of therapy (have they cancelled appointments?), whether they came alone, and how much they believe in the importance of therapy. How the values are derived will be made clear later in the paper, but it can be seen that the vector holds some of the data derived from the assessment interview which will be used for classifying the client into either the therapy category or the non-therapy category.

A category is represented by a hierarchical structure containing two types of component: irreducible datum components correspond to some aspect of the domain which can be directly measured; concepts are more abstract and are composed of subcomponents which may themselves be concepts or else datum components. In Buckingham’s (1992) model, this category structure is called a galatea after Pygmalion’s statue (Hamilton, 1942) because it attempts to focus on a representation of the perfect member of that class.

One of the concepts identified by the consultant psychotherapist was “commitment to therapy” which is illustrated by Figure 2. It consists of three subcomponents (square boxes for data and ovals for concepts), the type of which depends upon the expert’s knowledge

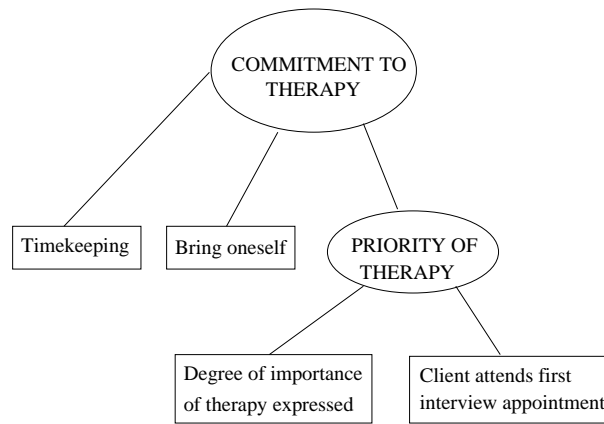


Figure 2: Hierarchy for the commitment-to-therapy concept. Concepts are shown as ovals and datum components are rectangles.

of the domain. For the priority-of-therapy subconcept, the expert is not able to assess it directly because it is a more abstract idea relating to more than one piece of information; in this case, it is a combination of two attributes which either have a concrete value in the domain, as for the datum called “client attends first interview appointment” which can only be true or false, or the expert is able to assign it a value, as for the “degree of importance of therapy expressed” datum where the expert can estimate through the course of the clinical interview a measure of this feature.

Each galatea (one for the therapy and one for the non-therapy categories) consists of the same type of structure but in a much larger tree. The category itself forms the root (more logically, the trunk) concept and it is subdivided into further components. Eventually, though, all concepts must be reduced to datum components (the leaves of the tree), by which time the structure has been fully defined. For the model of psychotherapy assessment, the two galateas have the same structure (but different values, of course), and the root concept contains six subcomponents, all of which are also concepts. The psychotherapist identified these as the main, top-level, components controlling the suitability of a client for psychodynamic psychotherapy. They consisted of the following ideas (the parenthesised numbers are explained in the next paragraph):

- Problem possessed (0.2): How much of a problem does the client appear to have? Is it overwhelming, resulting in a crisis state, or insufficient to stimulate the process of change?
- Capacity to make therapeutic relationship (0.2): How likely is it that the client will engage productively with the therapy?
- Ego strength (0.2): What is the client’s general level of ego strength (the degree of which is considered to influence the benefits of therapy)?
- Personal resources (0.2): How compatible with therapy are the client’s circumstances and personality?
- Defensiveness (0.1): How resistant or suggestive is the client likely to be?

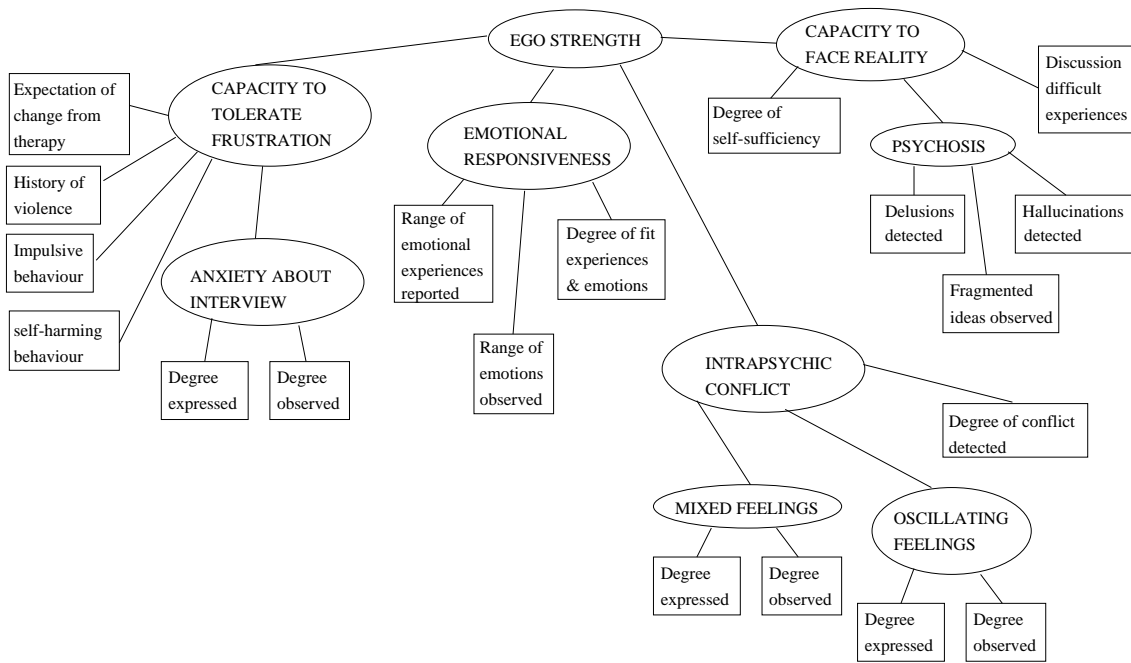


Figure 3: General structure of the ego-strength concept: concepts are shown as ovals and datum components are rectangles.

- Dominance of severe mood state (0.1): Is there some overbearing aspect of the client's psychological state which will militate against therapy?

Every concept has a ratio of influence attached to it by the psychotherapist which governs its relative effect on the overall classification process. These are shown in brackets after the concept name and indicate that the first four have equal influence of 0.2 which is twice that of the last two. Rather than describe the internal structure of all six concepts, here we will focus on an examination of ego-strength to illustrate how it contains the human expertise.

## 2.1 Structure of the ego-strength concept

Figure 3 shows the general structure of the ego-strength concept. It contains four sub-concepts—capacity-to-tolerate-frustration, emotional-responsiveness, intrapsychic-conflict, and capacity-to-face-reality—each of which are further broken down and defined. The detailed knowledge is contained by the values assigned to the various components; for the concepts, this consists of a single ratio of influence (RI) which controls how much effect each one has on its immediate superconcept. Capacity-to-face-reality is considered to be the most important (the expert gave it an RI of 0.4), followed by capacity-to-tolerate-frustration (0.3), intrapsychic-conflict (0.2), and finally emotional-responsiveness which was assigned an RI of 0.1. But the values contained by the datum components are considerably more complex and will be described by defining the quantification of the emotional-responsiveness subconcept of ego strength (Figure 4). It will demonstrate the means by which the psychotherapist's expertise is represented.

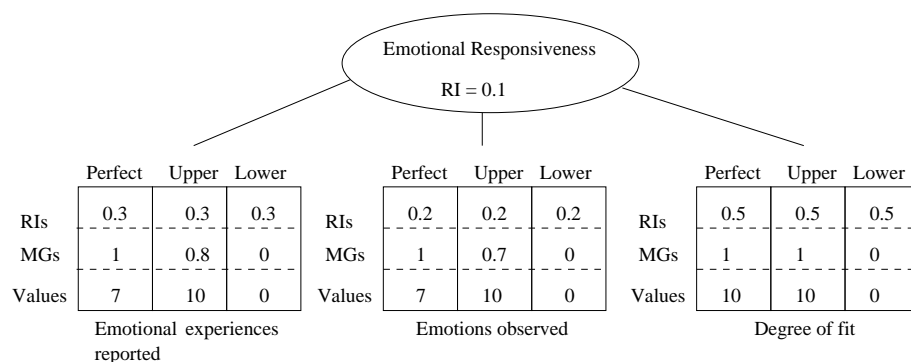


Figure 4: Emotional-responsiveness concept in the therapy galatea showing the datum perfect and limiting values with their associated membership grades and ratios of influence. RI = Ratio of Influence and MG = Membership Grade.

## 2.2 Emotional responsiveness and its datum component values

The emotional-responsiveness concept (see Figure 3) has three subcomponents, all of which are datum ones (they relate to a directly measurable or rateable aspect of the client being assessed). Each is given the perfect value with respect to the class it represents (therapy or non-therapy). That is, the value maximises the likelihood of an object being in that class. For the emotions-observed datum (see Figure 4), the psychotherapist decided that it should be a continuous value going from 0 (monotonous emotions) to 10 (extreme range of emotions). In the therapy category, the perfect value of this datum was considered to be 7—the patient should be capable of expressing a good range of emotions but not so large a one that they are “acting”.

The datum components are also given one or more limiting values, the values which minimise the chance of an object being a member of the class. Again for the emotions-observed datum, the worst value, if one was to consider taking somebody on for therapy, is 0—a complete lack of emotional variety. However there is also another limit, 10, and there needs to be some mechanism by which the contra-indicative nature of it is measured with respect to 0 and the perfect value of 7. This is done by attaching a membership grade (Zadeh, 1965) to each value; it assesses the amount of membership in the category containing that datum a person should have if they have the perfect or limiting value. For the datum under consideration, Figure 4 shows that the expert attached maximum membership to the perfect value, 0 membership to the worst limiting value, and 0.7 to the other limiting value, indicating that if a person is suitable for therapy, it is better to express extreme emotions than none at all.

A client’s membership in each datum is found by comparing the corresponding feature vector component with the datum. If the component value is the same as one of the perfect or limiting values in the datum, then the membership grade (MG) will be the same as that of the matching value. If it falls between a limiting value and the perfect one then the MGs are determined by simple linear interpolation. For example, a person whose range of emotions is observed to be 4 by the assessing psychotherapist (see Figure 5) has an MG of 0.571 because it is four-sevenths of the difference between the MGs attached to 0 and 7. How these individual membership grades translate into membership of the concept containing the datum components is dependent upon the ratios of influence.

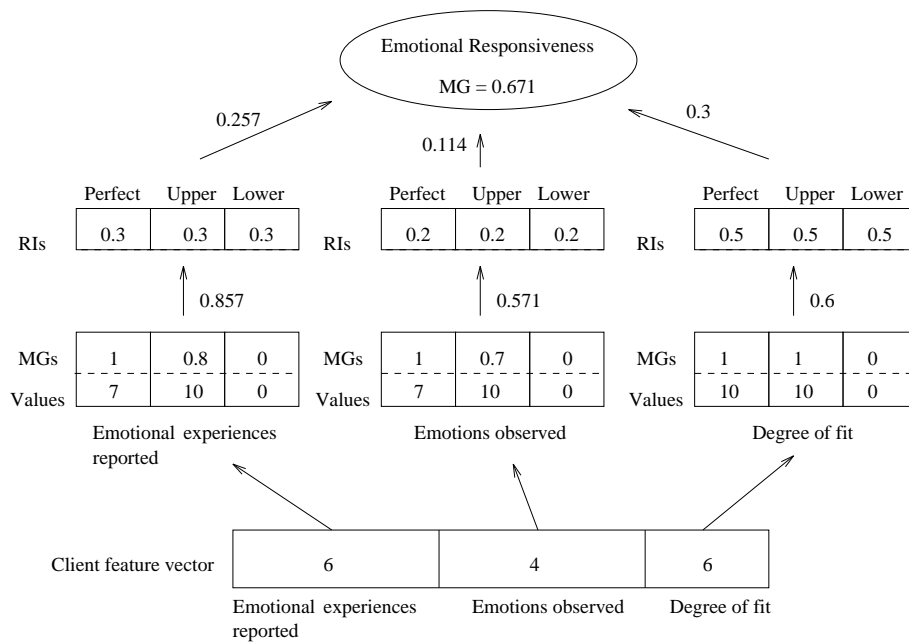


Figure 5: Classification of a client in the emotional-responsiveness concept within the therapy galatea. RI = Ratio of Influence and MG = Membership Grade.

With the emotional-responsiveness concept, the psychotherapist considered that the emotions-reported, emotions-observed, and degree-of-fit components should have RIs of 0.3, 0.2, and 0.5 respectively. In other words, the most important aspect of the concept is that emotional manifestations reflect underlying emotional experiences.<sup>3</sup> The client's MG in each of the three datum components is multiplied by the RI for that datum and the sum across them gives the MG of the client in the emotional-responsiveness concept. Figure 5 shows how this works for a hypothetical client. The resulting MG in the emotional responsiveness concept is then multiplied by 0.1 (the RI for that concept) and contributes to the MG in ego strength in exactly the same way as it received the MGs from its own subcomponents. When this process has travelled all the way up to the top-level categories, the classification process is complete and the clients will have been given a membership grade in the therapy and non-therapy classes which can then be used to judge their suitability.

Figure 7 shows how all the matching client values percolate upwards to give the MG in ego-strength for that client (detailed analysis of the figure is contained in the discussion of the model as a decision-support system). The full complexity of the model can be obtained from Buckingham (1992) but the important aspects for this paper are the way in which knowledge is contained by it and the process of propagating MGs through the structure.

From the description given, it will be noted that the galatea values are static; that is, they are entirely dependent upon the expert. This is in common with most expert systems which use elicited rather than learned knowledge (Buchanan, 1989). Mycin (Buchanan

<sup>3</sup>The expert can assign a different RI to each of the perfect and limiting values if desired but, for this model, in most cases a single one sufficed for all values within a datum.

and Shortliffe, 1984) is one of the most famous examples in the medical field. It contains rules and estimates of uncertainty, all of which were provided by a highly experienced doctor and none of which are updated automatically by the system. Even the more probabilistically-orientated systems, including those based on the relatively new idea of Bayesian belief networks (Charniak, 1990), rely primarily on human experts to provide the various external probabilities (e.g. Lehmann and Shortliffe, 1990; Hamilton, Anderson, Bartels, and Thompson, 1994).

The reluctance to incorporate learning from each new diagnosis is because the constructors of expert systems tend to have more confidence in the elicited human knowledge than the implied knowledge within a database, assuming it exists. And they would rather not allow the computer system to diverge from its originator by some partial learning method. Hence machines which learn their own rules from a series of known cases by, for example, the induction of decision trees (Quinlan, 1986), have not become standard practice. But it is the necessity for explanations which provides the most compelling reason for keeping expert systems tied to their human sources. This eliminates neural nets (Rumelhart and McClelland, 1986), which have excellent learning capabilities but their decision-making process is obscured from the human user and they are unable to justify their conclusions.

Despite the difficulties, it is still the intention to incorporate some learning capacity within the galatean model. It will be linked to a database containing information on all previously classified clients and statistical analyses will be used to suggest alterations to the various parameters (perfect and limiting values, etc.). In other words, the learning is still via the human expert who can decide from the database feedback whether or not the parameters, or even the knowledge structure, requires updating. A truly autonomous system would learn and adapt itself without reference to the user and there is increasing interest in the merits of machine learning as opposed to the acquisition of knowledge from a human (Ben-David and Mandel, 1995). However, a more cautious approach is likely within the medical domain because the practitioner must retain full responsibility for, and therefore knowledge of, decisions which may literally be a matter of life and death.

### 2.3 Generating the questionnaire

One aim of the research was to generate a questionnaire which could be used to gather the information relevant to assessing clients. The galatea structure has turned this into a simple task because the datum components have identified the desired data and also specified its type—yes or no (e.g. the delusions-detected datum) or a range from 0 to 10 (e.g. the emotional-experiences-reported datum) or sometimes just a value (e.g. the number of minutes late the client was for the appointment). All that is required is that the questions are suitably framed. Figure 6 gives the questionnaire portion which obtains the information needed for assessing ego strength (the consultant psychotherapist set the scale from 1 to 6 but the answers are easily converted into the range specified by the model).

The questionnaire<sup>4</sup> relating to the full model of psychotherapy assessment has 76 questions which map into the 76 datum components of each galatea. One further question captures the overall opinion of the assessor as to how much the client will benefit from psychodynamic psychotherapy. The greater the postulated benefit, the larger should be the membership grade in the therapy category for that client.

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<sup>4</sup>A copy of the full questionnaire can be obtained from the authors.



6) How much intrapsychic conflict was expressed?	1 2 3 4 5 6
7) To what extent were mixed feelings expressed?	1 2 3 4 5 6
8) To what extent were mixed feelings observed?	1 2 3 4 5 6
9) To what extent were oscillating feelings reported?	1 2 3 4 5 6
10) To what extent were oscillating feelings observed?	1 2 3 4 5 6
32) How much change did the client expect from therapy?	1 2 3 4 5 6
35) To what extent has the client resorted to acts of violence?	1 2 3 4 5 6
36) To what extent has the client behaved impulsively?	1 2 3 4 5 6
37) To what extent has the client deliberately harmed him/herself?	1 2 3 4 5 6
38) To what extent was anxiety about the assessment reported?	1 2 3 4 5 6
39) To what extent was anxiety about the assessment observed?	1 2 3 4 5 6
40) How much was the client able to talk about difficult experiences or feelings?	1 2 3 4 5 6
41) To what extent is the client self-sufficient (food, shelter, hygiene, etc)?	1 2 3 4 5 6
42) To what degree were fragmented ideas or experiences reported?	1 2 3 4 5 6
43) Were delusions detected?	Yes/No
44) Were hallucinations detected?	Yes/No
45) To what extent were a range of emotional experiences reported?	1 2 3 4 5 6
46) To what extent were a range of emotions observed?	1 2 3 4 5 6
47) What was the degree of fit between experiences and emotions?	1 2 3 4 5 6

Figure 6: The questionnaire parts obtaining the information relevant to assessing the client's ego strength.

## 2.4 The full model

The current full model of psychotherapy assessment contains the same six top-level concepts described in Section 2. Each of them has a more or less complex structure on the same lines as that shown for ego strength (Figure 3). In total, there are 46 concepts within each galatea (including some which are contained in more than one place) and 76 datum components. All components have a ratio of influence (the datum ones can, in theory, have 3 or more) and most the datum components have 3 values, each with an associated membership grade. It adds up to over 500 numbers assigned to each galatea by the consultant psychotherapist (JB). With this kind of complexity, it is impossible to predict just from the parameters how the computerised model will process a questionnaire and so the accuracy of the computer decisions must be due to the sensible structure and values of the model rather than to bias introduced by trying to match questionnaire answers to the desired classification response.

Table 1: Galatean membership grades in the therapy (THER) category for 24 clients; the benefit (BNFT) column is the therapist’s rating of how beneficial therapy will be for the clients.

Client	Ther	BNFT	Client	Ther	BNFT
1	0.82	5	13	0.61	4
2	0.76	4	14	0.60	4
3	0.75	4	15	0.59	4
4	0.73	4	16	0.58	3
5	0.71	5	17	0.56	2
6	0.69	4	18	0.56	3
7	0.67	4	19	0.54	2
8	0.66	3	20	0.47	1
9	0.66	4	21	0.46	1
10	0.64	3	22	0.42	3
11	0.64	3	23	0.37	1
12	0.61	2	24	0.27	1

### 3 Initial results

Questionnaires for 24 client assessments have been completed by the consultant psychotherapist so far. The final question asks “to what extent is the client likely to benefit from psychodynamic psychotherapy?” where 1 is none and 6 is the maximum. If the galatean model is simulating the psychotherapist then the membership grades it outputs in the therapy category when given the questionnaire data should positively correlate with the ratings of benefit. Table 1 shows that this is clearly the case ( $r = 0.825$ ,  $p < 0.0001$ ).

The biggest anomaly in the table is Client 22 who is rated as highly unsuitable by the model but not by the therapist. This turned out to be a recording error; the assessment notes showed that therapy was not recommended due to the client’s inappropriate profile but the therapist had inadvertently put down a different rating on the questionnaire (3 instead of 1). With a revised value of 1 put into the table of results, there is an even stronger correlation ( $r = 0.872$ ). However, the most important aspect is that the model accurately spotted the mistake and, if desired, could have given an explanation (as described in Section 4) for its own, lower, rating of the client. This is powerful evidence in favour both of the model’s success in capturing the assessment process and its ability to act as a decision-support system.

### 4 Using the model as a decision-support system

Because the galateas are based on a cognitive model, they should make intuitive sense to the expert and there is considerable evidence to this effect. For example, many researchers have demonstrated the difficulty that people have with providing probability judgments (e.g. Christensen-Szalanski and Bushyhead, 1981; Eddy, 1982; Schwartz and Griffin, 1986) and some have advised the use of different methods of capturing uncertainty (Ayton and Pascoe, 1995; Fox, 1994; Teigen, 1994); the galateas do so by using membership grades and ratios of influence, both of which have proven to be variables for which a human

Concept	Membership Grades	
	Client 2	Client 23
Problem possessed	0.151	0.094
Capacity to make therapeutic relationship	0.165	0.040
Ego strength	0.139	0.080
Personal resources	0.153	0.063
Defensiveness	0.077	0.021
Dominance of severe mood state	0.072	0.076
Total	0.757	0.374

Table 2: Top-level membership grades in the therapy category for Clients 2 and 23.

expert can supply meaningful values. Similarly, there is evidence that people classify using prototypical instances (Hampton, 1993; Malt, 1989) as well as being responsive to the distribution of values (e.g. Fried and Holyoak, 1984; Nisbett and Kunda, 1985). Direct support has been obtained both for the model’s psychological validity (Buckingham, 1992) and its ability to evolve into a hierarchical structure compatible with that of the expert (Birtle and Buckingham, 1995).

As a result, the propagated values should be easy to understand such that they provide a clear explanation as to why the model has judged one person to be suitable for therapy (by having a high MG in the therapy category) and another person unsuitable. This can be illustrated by examining the membership grades of a client in the ego-strength concept. Table 2 shows the top-level membership grades of the second-best and second-worst rated clients from Table 1 (the only reasons for picking these is to avoid the most exceptional cases which may have unrepresentative differences).

A comparison of the membership grades shows that Client 2 has a better profile with respect to being taken on for psychotherapy on all except the dominance-of-severe-mood-state concept. The biggest disparity is found with the capacity-to-make-therapeutic-relationship and much of the explanation for the difference between Clients 2 and 23 is held within this concept. However, the motive for scrutinising one part of the galatea instead of another may not be due to the biggest MG difference because the user could be fully expecting it; it might be because one of the concepts has been given a lower (or higher) than expected MG and the user wants to find out the reason for it. Suppose this was the case for the ego-strength concept. The computerised model allows the user to scrutinise the propagation of values through the ego-strength concept at all levels, perhaps displaying the results as shown in Figure 7 for Client 2.

The reasons for why Client 2 has a high ego-strength MG is contained within the client values, their matches with the datum components, and the filtering of the resulting MGs through the superconcepts. Part of the explanation can be constructed by tracing the values through the emotional-responsiveness concept (labelled “emotions” in Figure 7: this one has been chosen because the galatea values for it have been discussed in Section 2.2 and are shown in Figure 4). Client 2 was rated as having a value of 6 (on a scale from 0 to 10) with respect to the range of emotions reported and this gives an MG of 0.857 in the corresponding datum component. On the other hand, the rating for the client’s observed emotions is only 4 which gives a lower MG in the corresponding datum; clearly, at least during the assessment interview, he tends to report his emotions more than he expresses them.

Membership grades in the datum components individually indicate the client’s suit-

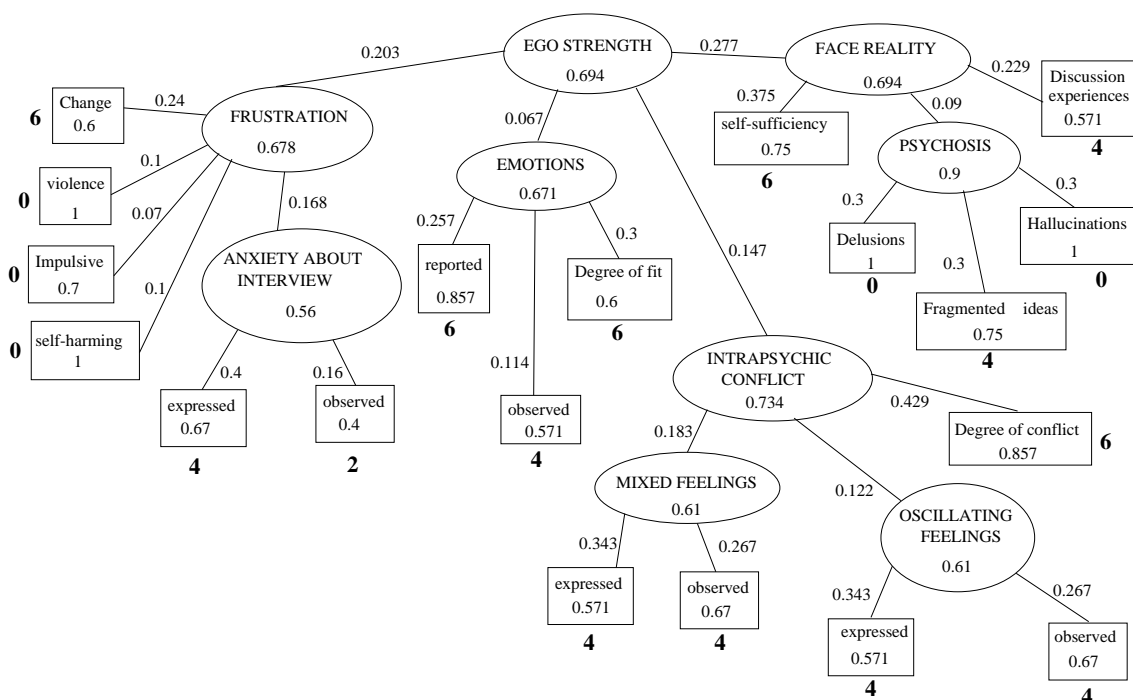


Figure 7: Membership grades (MGs) in the ego-strength concept for Client 2. The values within the ovals and boxes are the MGs for the client in that concept or datum and the values on the lines connecting them to their superconcept are the values percolating upwards after multiplication by the ratios of influence (not shown in the diagram); the bold numbers next to the boxes are the values of the client for the corresponding datum component (i.e. the values allocated by the assessing psychotherapist).

ability for therapy; but the eventual contribution of those components depends upon how they are combined. So, for example, the degree-of-fit MG is less than that of the emotions-reported datum but the actual contribution from the degree-of-fit to the emotional-responsiveness superconcept is higher (0.3 as opposed to 0.257). This is due to the greater influence specified for it by the consultant psychotherapist upon whom the model is based (a ratio of 0.5 compared to 0.3, as shown by Figure 4).

Similar scrutiny of all datum and concept components will result in a comprehensive explanation for how the classification grading was produced. The main obstacle is not the suitability and availability of the information but the ability to display it effectively (a human-computer interface problem outside the scope of this paper).

A comparative analysis will determine why one client was taken on for therapy and another was refused. Table 3 shows the membership grades of Clients 2 and 23 for the immediate subcomponents of ego strength and it is evident that the intrapsychic-conflict and capacity-to-face-reality concepts have the most influential difference. Figure 8 displays the MG propagation for Client 23's classification in the latter concept. By comparing it to that of Client 2 (Figure 7), the reasons for the difference in MG can be discerned. Client 23 has slightly more fragmented ideas, resulting in a marginally worse (with respect to psychodynamic psychotherapy) psychosis score but the more important differences are due to less self-sufficiency and less ability to discuss difficult experiences. Hence the

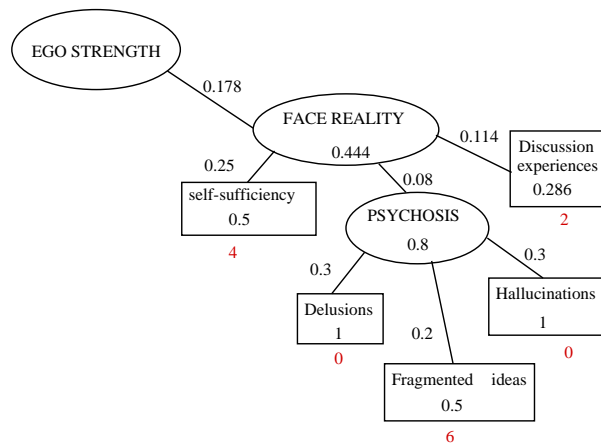


Figure 8: Membership grades (MGs) in the capacity-to-face-reality (abbreviated to face-reality) concept for Client 23. The values within the ovals and boxes are the MGs for the client in that concept or datum and the values on the lines connecting them to their superconcept are the values percolating upwards after multiplication by the ratios of influence (not shown in the diagram); the bold numbers next to the boxes are the values of the client for the corresponding datum component (i.e. the values allocated by the assessing psychotherapist).

Concept	Membership Grades		
	Client 2	Client 23	DIF
Capacity to tolerate frustration	0.203	0.185	0.018
Emotional responsiveness	0.067	0.010	0.057
Intrapsychic conflict	0.147	0.029	0.118
Capacity to face reality	0.277	0.178	0.099
Total	0.694	0.402	0.292

Table 3: Membership grades for the immediate subcomponents of ego-strength for Clients 2 and 23.

contribution of the reality concept to ego strength is significantly smaller than that for Client 2 (0.178 compared to 0.277).

Clearly the model is eminently capable of justifying the reasons for the decisions it makes, thereby accomplishing one of the research aims stated at the beginning of this paper. The description of differences between the two clients demonstrates how easy it is to assimilate the classification process and understand exactly how the various components have contributed to the overall assessment. The trace represents a comprehensive explanation and the better the computer system's feedback facilities with respect to the classification process, the more it will act as an effective decision-support system. In theory it means that the assessor's role can be focussed on data gathering (through the assessment interview) rather than on worrying about the decision to be made—this can be achieved by the computer and Bolger (1995) has postulated such a role shift.

## 5 Summary and conclusions

The main purpose of this research was to represent the assessment process for psychodynamic psychotherapy by a computerised model of human classification. The chosen model was described along with the way in which it contained the required expertise. Running the computer system on data from real assessment interviews demonstrated a strong correlation between its decisions and those of the consultant psychotherapist. Not only does the model appear to have accurately captured the assessment process but its psychological roots also engender an explanation in terms which are accessible to the human user. This enables the model to become the core of a decision-support system where the main additional requirements would be feedback facilities and an effective human-computer interface.

There is a tendency for psychological theories to be vague and ambiguous. The assessment process is no exception, but what could have ended up as an arcane activity has been both qualitatively and quantitatively specified by its formalisation as a computer model. An immediate benefit is the identification of relevant data to be accumulated during an interview and has enabled the production of an accurately targetted questionnaire. Although this is based upon the knowledge of just one psychotherapist, it is reasonable to assume that it has considerable general applicability; further research could validate and add to it by involving other experts. The important point is that the questionnaire provides the foundation for gathering meaningful data which can then be used to monitor the effectiveness of clinical assessments. For example, analysis of the data could help evaluate one aim of assessment which is to make a prognostic statement about the likely duration of therapy and the nature and degree of improvement which may be obtained.

Further developments could extend to the interface between clinicians working within a psychological therapy service and those referring clients for treatment. If assessment models of other potential treatments were created in the same way as the one for psychodynamic psychotherapy, they could be added to the computer system and general practitioners could be assisted in determining who might benefit from a psychological approach versus other interventions. There would be a streamlining of the referral process with obvious benefits to clients, referrers, assessors, service managers, and those purchasing the services, who not only have to choose between a wide range of treatments but also have increasing pressure on them to justify the use of clinical resources. Once fully developed, the system would have potential for use in teaching by helping trainee assessors to consider why one particular psychological treatment is the most appropriate for a particular client.

Finally, with respect to monitoring the general performance of a therapeutic service, a crucial role for the galatean model would be in recording the success rates for the institution — or, at least, its effectiveness of treatment. This paper has described how a computer system has represented the process by which one therapist decides who is suitable for psychodynamic psychotherapy and who should be referred elsewhere. Exactly the same modelling approach could also capture the knowledge and activities involved when a therapist feels that a client is ready to stop therapy. In this case, the classes could be something like “no longer requires therapy” and “therapy still required”. The data recorded for the clients and used in their classification would provide a powerful outcome measure—increasingly relevant if it is true that an emerging view considers the *absence* of evidence for the benefit of therapy to mean that therapy actually *has* no benefit (reported by Robert Elliott, 1996). It is imperative that treatments are properly evaluated within a

financial climate which demands tangible proof of money being “well spent”.

## 6 References

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