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Measuring the Psychological Characteristics of Titles of Journal Articles and their Subject Headings

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ABSTRACT

This paper gives the results of three measures given to 200 college students who rated the positivity of titles of articles and books shown either as full bibliographic citation or as title only. Half of the titles were taken from the university's academic library's section on humanities-social sciences, and the other half from the science-technology section. Several ANOVA tests are reported. Titles from humanities-social sciences were more correctly associated with their subject headings and were recalled better than titles from the science-technology area. The results are discussed in the context of a theory of titles that specifies three psychological characteristics of all titles that are present within the linguistic or bibliographic meta-information. The relationship of these characteristics to general features of human behaviour is specified as the affective, cognitive, and sensorimotor properties of titles.

Keywords: Information search behaviour, titles analysis, subject headings, psychological characteristics, affective, cognitive, sensorimotor

1. INTRODUCTION META-TEXT VS. TEXT

Communication is the transfer of ideas. This societal activity is facilitated by the tradition of documentation, which provides an orderly way of accomplishing the transfer of ideas across place and time. A central approach in the method of documentation is the use of titles and headings. The discourse of communication contains two functional levels in relation to documentation and to titles, namely, the ordinary level and the elevated level. The ordinary level of discourse is made up of descriptions and assertions people make in relation to their observations or opinions. This is what, in a document, called the body of the text. In contrast to this ordinary text, there are headlines, titles, sub-titles, subject headings, descriptors, keywords, which make up an 'elevated' level of discourse. They are made physically stand out by making their size bigger or different by underlining, bolding italicising or indenting. Headings or titles are actually comments about the surrounding text.

The title of a book chapter says something about what is in the chapter. Subject headings herald the entire content of a particular subject and collect them together into a distinct bunch with a specific boundary. Because of their special function in discourse, titles or headings are to be considered as meta-text in relation to ordinary text. In consequence, one needs to examine in what way the discourse of titles and headings is different from the rest of the text in a document. Titles and controlled vocabularies that are used as subject headings, occupy an important focus in the information disciplines that are concerned with the flow of information and its accessibility. This paper presents evidence that titles have psychological characteristics in the sense that titles influence the perceptions, thoughts, and feelings of readers, searchers, or users.

In a social interaction the head of the person occupies the chief place. To address the person, one looks at parts of the head. Similarly, in a document it is the elevated discourse that it first addressed. To the browsing eye, headings, titles, and sub-titles provide a guide to content and a clue to conceptual structure. A similar 'elevated' function is served by the headings attached to tables and figures or illustrations and their captions. The same is true of other physically marked components such as footers and page numbers. A document is thus always made up of text and meta-text. Meta-text in the form of titles or headings plays an important role in the retrieval of documents from library collections, online databases, and human memory. One might suspect that just as ordinary

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text varies in effectiveness or validity, the meta-text of titles, headings and descriptors may also vary in efficiency. The creation of a document thus involves two partially independent systems of communication. It is useful therefore to know what characteristics titles have and to understand how the properties of titles influence searches.

1.1 Cognitive Characteristics of Titles

According to Maiti & Dutta[1] titles are generally assumed to be a concise abstract of an article reflecting its central theme. They argue that words in assigned keywords or subject headings may poorly match those in titles. Jacques & Sebire[2] present data indicating that the construction of an article title has a significant impact on how frequently the paper is cited. Studies have demonstrated that varying the presence or content of titles can influence the comprehension, recall or speed of reading and interpreting text under controlled test conditions[3-6]. Titles have been shown to aid in the assimilation of lecture content[7], to reduce the ambiguity of paragraphs[8], and to facilitate the organisation of text in reading improvement techniques[9]. Perfetti & Goldman[10] theorise that titles act as 'recall probes' and provide a 'stable referential focus' for long term memory. The meaning of a task and people's expectancy of success can be manipulated by the choice of titles, which thus act as 'attributional cues'[11]. Nahl-Jakobovits & Jakobovits[12] discovered that journal articles in disciplines that employ the experimental method, commonly express in their titles the dependent and independent variables.

1.2 Affective Characteristics of Titles

Not only cognitive processes are influenced by titles, but affective as well. For instance, a dimension of 'sensationalism' of titles was operationally defined using a specialised Dictionary of Affect[13]. Stedman and Alpher[14] analysed titles of pop songs into categories that overlap with the classification and treatment of emotional illness, and Strahan & Howard[15] found that titles and subject headings in psychology arouse differential evaluations along affective dimensions (important, trivial, interesting) as well as cognitive (scientific, experimental, behaviouristic). Jakobovits & Osgood[16] examined the attitudes of psychologists towards journal titles in their profession and found distinctive clusters of journals that shared a common affect (e.g., rigorous and specific vs. unscientific and general).

1.3 Sensorimotor Characteristics of Titles

In a different line of research, investigators have shown that the wording and format of titles of scientific documents can be used to index historical changes in the content and complexity of disciplines[17,18]. For example, Buxton & Meadows[19] show that between 1947 and 1973, the length of titles of articles in the sciences gradually increases, more so for chemistry and botany than for the social sciences and philosophy. The lengthening of titles was also noted with psychology titles in France for the period 1900-1969[20]. The use of the word 'disability' in journal articles has been gradually declining, reflecting this decade's new political attitudes towards the handicapped[21]. The use of colons in titles or, 'titular colonicity,' becomes a marker for Dillon[22] to index the progress of scholarship over a century, or at least, its increasing conceptual complexity.

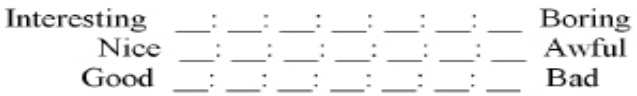
2. AIM

To study psychological characteristics in the sense that titles influence the perceptions, thoughts, and feelings of readers, searchers, or users.

3. METHODOLOGY

In an attempt to study the psychological characteristics of titles, three measures were devised to represent the three generally agreed upon psychological domains of behaviour, namely, the affective, the cognitive, and the sensorimotor[23,24].

The 'affective' measure of titles consisted of people's ratings of specific titles on bipolar semantic



differential scales chosen to reflect the concept of 'positivity.' The following is an illustration by[25]:

The person is instructed to 'rate the title of this article' by placing a check mark on one of the seven positions on each scale provided. In the analysis of the data, each rating is assigned a score of 1 (extremely positive) to 7 (extremely negative), with 4 defining the mid-point as equally positive and negative. An average Positivity score is calculated for each title over all the raters and scales (three in the present case). If a title receives a low average score (around 1 or 2), then it is viewed very positively by subjects. If a title obtains an average score of around 6 or 7, then that title is perceived as very negative. Each pair of experimenters chose their own three scales to represent the concept of "positivity."

Two hundred respondents were male and female college students in their early twenties enrolled in the Psychology Major program for undergraduates in their Sophomore year (age range 21-24).

A 'cognitive' measure for titles was devised by having raters identify the correct subject heading for a specific title. All titles were chosen from periodical indexes so that each title's listed subject heading was also noted. The raters were given

several subject headings below each title and were instructed to 'choose the subject heading that best goes with this title.' Only one of the subject headings listed was the correct one as obtained from the periodical index. The alternatives were either different subject headings from the same periodicals or fabricated ones. A score of 1 was given for every correct choice and an overall score was given by summing over all attempts (six in the present case). This cognitive measure was called 'ease of subject heading identification.' By averaging the data over all raters, each title received a score. The higher the score for any title, the easier it is for subjects to identify the correct subject heading for that title.

As a measure of the 'sensorimotor' aspect of titles, raters were instructed to write down from memory the titles they were shown when rating them for positivity, and when trying to identify their correct subject headings. The ratings of the three titles on the three scales and the subject heading identification task together took between one and two minutes. Thus no time was given to study or rehearse. A score of 1 was given for every correctly reproduced title word. Each title thus received an ease of reproduction score. The higher this score for any title, the easier it is to reproduce from memory under these test conditions.

3.1 Data Collection Procedures

The data were collected by the college students participating in a group data collection exercise in an undergraduate course in statistics. Students worked in pairs, jointly choosing periodical indexes at the university library, selecting titles, recording their subject headings, and preparing a test booklet containing three titles and instructions for obtaining the three dependent measures described above.

There were two independent manipulations in the booklets distributed to the raters: Context and Disciplines. The 'Context' factor had two levels: Full and Partial. In the Full Context condition each of the six titles appeared within a full citation (as in the illustration above). In the Partial Context condition only the title itself showed. Otherwise the two types of booklets varying the Context factor were identical and consisted of printed pages stapled together. When the booklets were distributed to the raters, half of them at random received booklets with titles in Full Context (complete citation) while the other half of the raters received booklets with Partial Context (titles only). In this way, random assignment of raters to the independent conditions was insured.

The second independent variable, 'Disciplines', also had two levels: HUM-SOC and SCI-TECH. In half of the booklets the titles had been chosen from the university library containing periodical indexes in the Humanities and Social Sciences (HUM-SOC). The other half of the booklets contained titles chosen from the reference area for the Science and Technology periodical indexes (SCI-TECH).

The design of the study is thus a 2x2 independent measures analysis of variance with four subgroups of 50 subjects each. The four conditions were represented by the four types of booklets: Full Context for HUM-SOC disciplines (subgroup 1), Partial Context for HUM-SOC disciplines (subgroup 2), Full Context for SCI-TECH disciplines (subgroup 3), and Partial Context for SCI-TECH disciplines (subgroup 4). The four types of booklets were randomly assigned in each of the test groups by all pairs of experimenters. Each booklet contained three titles (either from HUM-SOC or SCI-TECH) and appeared either in Full Context or in Partial Context.

Each title was rated on three dependent measures: positivity (affective measure), ease of subject heading identification (cognitive measure), and ease of reproduction (sensorimotor measure). Each pair of experimenters worked independently and chose their own six titles and subject headings. Each pair tested 5 raters in each of the four cells (conditions). Thus the data includes 200 people and 60 titles.

4. RESULTS AND ANALYSIS

Personal experience lead to the expectation that in terms of the affective measure SCI-TECH titles might receive less positive ratings because of their more technical nature. For a similar reason one might expect lower scores for SCI-TECH titles with the cognitive measure of ease of subject heading identification. Further, it was reasoned that a full context would yield better scores for ease of subject heading identification than a partial context, since the additional citation information could serve people to make a matching decision. In terms of the sensorimotor measure of title reproducibility, prior literature from the field of verbal learning would predict that partial context should produce higher reproduction scores since there was less information to decode[26]. In other words, the extra citation information of author, journal, volume and date may act to diffuse attention or may produce an interference effect, thus reducing the score[27].

4.1 Positivity of Titles

For the affective score of 'Positivity' of titles, the means for all subgroups and titles combined were close to 4, the neutral position. The independent measures ANOVA yielded an insignificant effect for 'Context' ($F(1,196)=1.12$), not significant. In other words the titles were rated about neutral on

positivity (rating: 4.00) under both-conditions full context (rating: 3.84) and partial context (rating: 3.97).

For the factor of 'Disciplines', the ANOVA yielded a significant effect (F (1,196)=4.80, p<01). In other words, the titles selected from the HUM-SOC periodical indexes were rated more positively (Mean=2.14, i.e., very positive) than the titles selected from the SCI-TECH periodicals (Mean=4.06, i.e., neutral or slightly negative). Inspection of distribution histograms (not presented here) shows the following general trend: the modal score is 3 (slightly positive) and only a few titles are ever perceived extremely (either positive or negative). This apparent hesitance in rating titles other than slightly positive or slightly negative is reflected by the very small standard error that ranged from .08 to 0.13 of a scale unit. The small error variance indicates that very few raters departed from this trend.

4.2 Ease of Subject Heading Identification

For the cognitive measure of ease of subject heading identification, the ANOVA disclosed a significant effect for 'Disciplines' (F (1,196)=4.68, p<.05) and a non-significant effect for 'Context' (F (1,196)=1.87). In other words, the titles selected from the HUM-SOC periodical indexes were more easily matched to their correct subject headings (Mean=2.14 correct out of three attempts) than the titles for the SCI-TECH periodicals (Mean=1.76 correct matching). Since the maximum score was 3, it follows that people were able to match the correct subject heading for 71 % of the HUM-SOC titles but only 59 % of the SCI-TECH titles. Though the context effect on matching titles with subject headings did not reach significance, the direction of the effects shown in Table 1 make sense (2.14 vs. 1.76). Presenting the full citation yields higher matching scores for both types of disciplines as shown by the rows on Interaction Effects. However, since the trend is not significant, the situation is ambiguous. Perhaps more than three titles of each type are needed to reliably establish this difference. Further theoretical developments are needed to identify the cognitive operations people use to match titles with their appropriate subject headings. One possibility might be that the reader expands a title and its descriptor into a paraphrase; if the two paraphrases match in meaning then they are seen as associated[28].

4.3 Ease of Title Recall or Reproduction

Finally, with respect to the sensorimotor measure of title reproduction, Table 1 shows that the partial context yields a significantly higher rate of correct reproduction (Mean = 15.56 words) than the full context (Mean = 11.92 words). The F (1,196) for the Context factor is 13.94, p<0.001). In other words, for the partial context where only the titles are seen, the raters can reproduce about 10 % more words than under the full context where the titles have to be isolated and discriminated from the additional citation information. This finding needs to be replicated under a more specific set of conditions that attempt to control the length of the titles and the amount of time raters are exposed to them. The fact that the partial context yields better recall than the full context can be attributed to the interference effect of the embedded citation information[29].

In terms of the effect of Disciplines upon title recall, the HUM-SOC titles were slightly easier to reproduce (Mean = 14.17 vs. 13.31 words), but this trend was not significant (F (1,196)=0.78). It may be that more titles need to be used to test this difference adequately.

Table 1. Effect of partial context and type of disciplines on three measures of psychological characteristics of titles

	Affective measure	**Cognitive measure**	**Sensorimotor measure**
	Positivity ratings (lower number = higher positivity) (1 to 7)	Number of Subject Heading Identifications (0 to 3)	Ease of Title Recall or Reproduction (0 to 16 words)
Bibliographic context partial (title only)	3.97	2.07	15.56**
Bibliographic context full (title, journal, date, pages)	3.84	1.83	11.92**
HumSoc Disciplines	2.14**	2.14**	14.17
SciTech Disciplines	4.06**	1.76**	13.31
Interaction Effect			
HumSoc/partial	3.81	1.94	5.62
HumSoc/full	3.68	2.34	12.72
SciTech/partial	4.13	1.72	15.50
SciTech/ full	3.99	1.80	11.12

**significant differences

Summarising the significant findings, It can be said that with regards to the manipulation of HUM-SOC vs. SCI-TECH periodicals, titles from more technical disciplines evoked from non-professionals less positive feelings and were more difficult to match with assigned subject headings. With regards to the Partial vs. Full Context manipulation, titles in a Full-Citation Context were less well recalled under artificial conditions of testing (i.e., reproducing three unfamiliar titles after looking at them for about one minute).

It is clear from these and other results as summarised in the introduction, that titles possess psychological characteristics that can functionally be classified within the three domains of human behaviour—affective, cognitive, and sensorimotor[30,31]. Figure 1 is an attempt to specify further the definition of these three domains of user behaviour in relation to titles and subject headings.

4.4 Comprehending and Producing a Title

The 'affective' characteristic of a title reflects its intended audience and purpose ('Who is it for? and Why should it be read?'). When reading a title we canreconstruct the affective information in the title if we know the general purpose of the document, how it relates to other documents (or its 'context'), and the authoritativeness of the work ('validity'). This information is contained in the title's presuppositions or assumptions, that is, the information it takes for granted and supposes the audience to already possess. Thus, the affect of a title lies in its presuppositions. As indicated in Fig. 1, the affective domain is the last of the three steps in the analytic or interpretation sequence (from right to left). Thus, one might be able to reproduce or even paraphrase a title (sensorimotor domain) without understanding its meaning or deeper message (cognitive domain). As well, one might comprehend a title and its implications (cognitive domain) without appreciating its importance or relevance (affective domain). There is thus a developmental evolution (from right to left) in the comprehension of a title, from its external form (sensorimotor domain), through its intellectual content (cognitive domain), to its essence, that is, its purpose and validity (affective domain).

AFFECTIVE ----------> *	COGNITIVE ----------> <----------	SENSORIMOTOR * <----------
Who is it for?	What is it about?	How is it expressed?
Why is it important?	Is it valid?	What does it say (meaning)?
Knowledge of	Aboutness	Style
Context	Accuracy	Genre
Purpose	Meaning	Taste
Intention	Precision	Surface structure
Authoritativeness	Content	Literal expression
validity	Deep structure	Paraphrases
Relevance importance	Argument rhetoric	Aesthetic profile
Intended audience		
<------- A N A L Y T I C order <--------- (comprehending a title: decoding)		
--------> S Y N T H E T I C order ---------> (producing a title: encoding)		

Figure 1. Three Psychological characteristics of titles

The 'cognitive' information of a title involves its aboutness and accuracy ('What is it about? and 'Is it true?'). While the affective domain pertains to human will and character, the cognitive is its intellectual embodiment in the mental form of human understanding[32]. The semantic dimension of good and bad pertain to the domain of the affective domain, while the cognitive domain has degrees of true vs. false or accurate vs. erroneous. The meaning of a title includes the cognitive implications that lie in the title's deep structure[33]. Comprehending a title involves being able to draw cognitive implications about it, such as the ability to specify the educational or intellectual level of the text, and some knowledge of the subject it may cover in its Table of Contents.

The sensorimotor information of a title reside in its literal form ('How is it expressed?').

The encoding act of creating a title is a generative or synthetic process (left to right in Fig. 1) that begins with the creator's intention and purpose (Who will it be for?), which belongs to the affective domain. The process continues with the cognitive characteristics (What is it to be about?), and ends with the sensorimotor presentation (How is it specifically to be expressed?).

Conversely, perusing a title is an analytic process of decoding from the sensorimotor information (How is it expressed?"), through the cognitive information (What is it about?), to the affective information (Why is it important?). Since a title functions as the head of a body of text, it corresponds to the threefold aspect of human affairs: purpose or motive from the will (affective domain), content and structure from the understanding (cognitive domain), and expression in use (sensorimotor domain)[34].

4.5 Needed—The Theory of Titles

Given that titles are culturally complex objects and exert significant influence in the flow and control of information, there is a need for a theory of titles. It ought to be sufficiently complex to integrate the psychological characteristics of titles with the principles of information flow and information control. One use of the theory of titles would be to account for the

elements outlined in Fig. 2, which lists the steps leading up to the creation of a title by an author, followed by the steps leading to its interpretation. by readers, and includes the role of the information specialist. The author's production of primary text and titles is a synthetic encoding process whereby the author's affective state (purpose, intention) produces cognitive sequences (context, aboutness) that are ultimately transformed into sensorimotor acts (expressions in words). This is shown in steps 1 through 4 in Fig. 2:

Producing a title is an inductive process while interpreting or using a title to make search decisions is an analytic or deductive process as depicted in steps 5 through 8 in Fig. 2. The use of titles by information specialists (steps 4-5-6) is to be distinguished from their use by library patrons or information seekers (steps 4-6-7-8). Cataloguers and indexers use titles when they make classification decisions by adhering to classification schemes with agreed upon notation rules as embodied in subject authority lists and other controlled index vocabularies peculiar to specific disciplines. Subject headings and descriptors or keywords used in the preparation of indexes can be viewed as elevated text fragments and their paraphrases or synonyms. In the creation of an alphabetic subject index, a certain type of semantic familiarity with a discipline is required in order to know which fragments or key phrases of the text of a document can be appropriately elevated to the status of an entry in a coordinate index[35]. In a keyword-in-context index title fragments are taken as entries. Search commands are actually concatenated title fragments separated by Boolean operators.

The meaning or interpretation of a title is called an annotation in Fig. 2 (step 6). Annotations are comments we make to ourselves (or out loud to others) about a title and are influenced by our momentary purpose or motive (affective) for reading (sensorimotor) and attending to the title (cognitive). These annotations and reactions to a title influence our cognitive processes and affective states. Acquiring knowledge and changing our attitudes as readers and consumers of information can thus be viewed in terms of consequences of a chain of events that began with the experiences and ideas of the author.

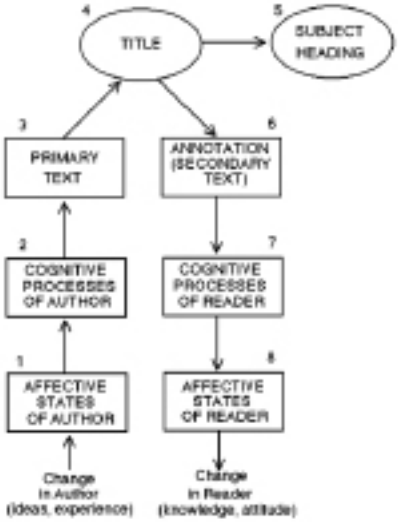


Figure 2. Flow of information in bibliographic communication.

Titles are thus vehicles for communication viewed as an exchange of affective, cognitive and sensorimotor acts between author and reader. Information specialists adjoin themselves to this flow through the classification of titles into information systems that help readers find titles through controlled vocabularies hierarchically arranged and interlinked through cross-references.

5. CONCLUSIONS AND FUTURE RESEARCH

The theory of titles will grow with the integration of research on titles in several disciplines that include library and information science, psychology, linguistics, English, and sociology. Information specialists can investigate the relation between the characteristics of titles and their ease of retrievability[36]. What aspects of titles cause them to be recognised as potentially relevant to a searcher? How can one instruct users to extract search relevant information from titles? Psychologists can focus on the titling act itself: How does personality affect the interpretation of titles? How do readers organize their ideas about a title? What characteristics of titles aid in their recognition and recall?

Linguists have analytic tools to map the structure of phrases and sentences[37]. These techniques can relate the surface structure or appearance of a title to its deeper structure which conveys meaning and allows for the derivation of implications and presuppositions. Some titles have a more difficult structure than others: Does the structural complexity influence the title's ability to be paraphrased? How do titles cluster semantically? Do titles and their subject headings cluster similarly? Can one demonstrate deep structure relations between titles and their text? Are there levels of titles? Coates[38] argues for levels of syntax in indexing languages and relates them to classification. A similar analysis is needed for titles and headings generally. Researchers in English and education can explore the personal factors that lead to the production of successful versus less successful titles as well as their acceptance by readers. They can also describe in greater detail the intuitions that allow experienced writers to convey meaning, genre and style through titles.

The problem of improving writing skills is related to the study of titles in a direct way since outlining,

is an essential activity in much of writing and is accomplished through the use of shorthand phrases that act as titles and sub-titles arranged in a meaningful sequence. Sociologists have an interest in titles as value objects at the societal and institutional levels. As was mentioned in the introduction, historical trends in the evolution of disciplines and topics have formed the focus of some investigations. Sociological inquiries may also focus on the social politics of naming new products and services. Names behave like titles and can be considered as equivalent in function.

Sub-cultural differences and class distinctions are accompanied by distinguishing markers that include verbal style and preferences for titles of songs, events, situations, and activities. One would expect from the sociological and sociolinguistic perspectives that ethnic background would influence the communication value and retrievability of titles. As a political remedy to this problem it is conceivable that in the future, documents and reference works may be known by different titles depending on the social or cultural setting. This would insure that titles are aids to the searcher, not sub-cultural barriers.

The theory of titles will be established through the integration of the entire complex of issues as understood in these disciplines.

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