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Shoshoni Conceptualizations of Plant Relationships

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SHOSHONI CONCEPTUALIZATIONS OF PLANT RELATIONSHIPS

by

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ABSTRACT

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Plant Relationships

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Interviews were conducted with 10 Shoshoni-speaking people to investigate conceptualizations of plant relationships. A card-sort technique and informal questioning were employed in an attempt to elicit plant classifications and taxonomic relationships. Results indicate classifications are based on multiple criteria including morphology, cultural utilization, geographic setting and growth habit. A paradigm which postulates conceptualizations based on prototypic images fits the data better than the supposition that memory is composed of extensive taxonomic structures.

(82 pages)

INTRODUCTION

The ability to classify aspects of experience and to behave in generalized ways to those classifications seems requisite to the adaptation of all organisms to complex environments, an ability which has reached its highest manifestation in human culture. This ability to classify and generalize one's behavior to aggregates helps reduce sometimes diverse and chaotic physical and social environments to more manageable terms. To classify a large group of items under the name of "food," for example, defines certain edible items in the environment as suitable for eating. Likewise, it is clearly to one's advantage to be able to classify people as friend or enemy when to find out the "hard way" may constitute a direct threat to one's survival.

Generalizing behavior towards categories may at times, however, be maladaptive. Virtually no culture classifies all edible items in its environment as "food." A disoriented hiker in the Great Basin may starve in the midst of edible plants, reptiles and insects because these items are not culturally defined as food. The same area may provide abundance to a Shoshoni family whose food classifications are a little more extensive.

The way in which a society classifies its environment strongly affects individual and group behavior. A culture creates a social reality through its classificatory schemes which influence and to

a large extent constrains the behavior of its members. It is the implicit recognition of this effect on behavior subsumed in the classificatory act that produces intense rivalry for the general acceptance of various classifications by conflicting interest groups in society. To have members of a society classify blacks as lazy or welfare recipients as cheaters, or the Democratic candidates as fuzzy on the issues affects behavior towards these groups in predictable ways. It is these effects on behavior that make cultural classifications of interest to social scientists.

Anthropologists have presented an approach to the study of cultural classifications referred to as "ethnoscience." According to Sturtevant (1966, p. 99) "ethno- is to be understood here in a special sense: it refers to the system of knowledge and cognition typical of a given culture." And "science" is essentially classification. Ethnoscience, then, refers to the particular way in which a society orders its material and social universe. Consequently, the ethnoscientific methodology stresses the explication of cultural classifications in the terms of the bearers of the culture and not in terms of the investigator's culture. An ethnoscientific study which describes a particular cultural domain such as "ethnobotany" would not list plants used by the culture into a Linnaen taxonomic format. It would, rather, attempt to discover the way in which the particular culture conceptualizes the plant world. In this relation, a useful distinction is made between "etic" and "emic." Ways of analyzing and classifying phenomena

based on features of the real world that are essentially culture-free are etic. The domain of color, for example, is reasonably well understood in physical and physiological terms to provide a concrete basis for the comparison of color classifications by different cultures. Classifications which are based on qualities of color are etic classifications in contrast to emic classifications based on culturally significant criteria. The ethnoscientific approach is emic in that it attempts to describe the classification of phenomena in terms of locally significant criteria.

Important tools and theoretical considerations for ethnoscience come from the field of linguistics, particularly psycho- and social linguistics. The institutionalization of the classificatory act occurs through language. The existence of a name for a given category constitutes prima facie evidence that the items in the category are conceptually aggregated by at least some of the members in the culture. A careful analysis of the language may reveal changes in classifications that have occurred through time. A certain suffix, for example, may have been associated with only a particular group of items. Through cultural contacts, the items in the group may have become reclassified into other groups and yet carry the original suffix. Language, therefore, is a record of the conceptual classifications of a culture.

The most controversial theoretical issue to be asserted by linguists is what has come to be known as the Sapir-Whorf hypothesis. The Sapir-Whorf hypothesis condenses into two major assertions, namely, linguistic determinism and linguistic relativity.

Linguistic determinism in its extreme form maintains that language is a critical factor in the development of conceptions of reality and therefore language determines thought. Linguistic relativity is based on linguistic determinism and concludes that if the languages of two people are different, then the thought patterns of the two people will also be different.

This study employs an ethnomethodological approach to the investigation of conceptualizations of plants by some Shoshoni-speaking people. This is accomplished by eliciting folk botanical taxonomies and a linguistic analysis of folk botanical terms used by the Shoshonis. Though dealing specifically with some of the problems of research in the study of folk taxonomies and employment of taxonomies as a method of conceptualizing reality, it also provides some general comments on the Whorf hypothesis.

The selection of Shoshoni conceptualizations of plants as a study domain was influenced by the following considerations:

1. Although considerably more complex than domains such as color and kinship, the etics of plants have been well systematized by modern science.

2. The Shoshonis historically have lived in intimate association with the plants in their environment. Their knowledge of and reliance on plants was vital to their hunting and gathering tradition.

3. As with native cultures the world over, the Shoshoni culture is rapidly disintegrating through assimilation. Hopefully

this study will preserve a part, however small, of the heritage of the Shoshoni people.

REVIEW OF LITERATURE

Psycholinguistics

Many descriptive terms have been associated with the word "linguistics" over the years. These terms include ethnolinguistics, psycholinguistics and the more recent term, sociolinguistics (Hymes, 1962). Although the work in this thesis may fall within the realm of sociolinguistics, psycholinguistics is the better developed field of study and will provide better defined tools for the explication of Shoshoni conceptualization of plants.

Psycholinguistics has been defined as "the study of language production and comprehension" (Glucksberg and Danks, 1975, p. 2). Berger and Luckman (1967) define language as a system of vocal signs which is capable of becoming the objective repository of vast accumulations of meaning and experience. Language is not only a social institution but is the prime conveyor of the "reciprocal typification of habitualized actions" which define institutions. There are three important general properties of language according to Glucksberg and Danks (1975). First, languages are productive. By this they mean that language is creative and although it would be impossible to memorize all the many utterances we may produce or hear in the course of a lifetime, human beings are, nevertheless, capable of producing and understanding an infinite number of verbal messages. Second, language has a duality of structure. An utterance may be analyzed at two levels: a sequence of words, each

with its own meaning and as a sequence of meaningless sounds. Duality of structure is one of the reasons that language is productive. With only a small set of meaningless speech sounds (never more than 100), the number of possible words in a language is virtually unlimited. Third, language employs arbitrary symbolic reference. There need be no relationship whatsoever between the sound of a word and its referent. These three properties of language--productivity, duality of structure and arbitrary symbolic reference--enable language to fulfill its primary function: the communication of a potentially infinite number of ideas.

According to Katz (1973) communication entails several operations. Semantic operations select words according to intended meanings, syntactic operations select appropriate sentence structure and phonological operations transform the message into speech sounds produced by the articulatory system. Semantic, syntactic and phonological operations are collectively referred to as the grammar of a language. Although logically sufficient for speech, the grammar must be modified by the operation of social editing to effect meaningful communications (Glucksberg and Danks, 1975). Social editing involves tayloring the form of the communication to the particular social circumstances.

The two key units of linguistic analysis are the phoneme and the morpheme (Osgood and Sebeok, 1965). A phoneme may generally be defined as the smallest unit in a language which makes a meaningful difference to the people who speak the language. It is the

minimal unit of phonology. The morpheme is the minimum sequence of phonemes which has meaning. Some words are monomorphemic, such as "house," or multimorphemic, such as "unchildlike." Colby (1966) points out a third unit of analysis: the lexical unit. The lexical unit is semantically exocentric, that is, the meaning of the whole is not deducible from the meanings of the parts. This is in contrast to units with endocentric meanings which may be deduced from the meanings of the parts. For example, the expression "he is in the doghouse" can be endocentric in meaning if it applies to one's pet dog but exocentric if it applies to a person who is in trouble. Exocentric expressions or lexical units are referred to as "lexemes" by Berlin (1969). Berlin further recognizes "unitary lexemes," that is, expressions, no segment of which may designate categories which are identical with, or superordinate to, those designated by the forms in question and "composite lexemes" which contain segments that may designate the same category as those designated by the forms in question or may designate categories superordinate to those designated by the forms in question. Unitary lexemes would be names such as oak, pine and maple, and composite lexemes would be names such as lima bean or scrub oak. Two additional concepts are important in the context of the present study. "Homonyms" are words that are identical in sound but represent different meanings which are totally unrelated to one another. "Polysemous" means that a word has multiple meanings (Glucksberg and Danks, 1975).

The relationship between language and thought is perhaps the most complicated and controversial problem in psycholinguistics.

In his article entitled "Language," Sapir (1933) discusses the difficulty encountered in extricating language from thought. This is largely because thought in any sustained sense is "hardly possible. . .without the symbolic organization brought by language." The most extreme theory of the effect of language on thought has been expounded by Whorf and has come to be known as the "Whorf" or "Sapir-Whorf hypothesis." Whorf explicates this hypothesis most clearly in his article, "Language, Mind and Reality" (1942) and it is well to review this article in some detail.

Scientific thought, according to Whorf, is approaching a "Babel" in which its specific dialects will confound the understanding of scientists at a time when such understanding is crucial to the advancement of knowledge. Each language or technical sublanguage, maintains Whorf, incorporates patterned resistances to divergent points of view. This is the importance of linguistic study.

Patterns are real in a cosmic sense and are serial or hierarchical in character as depicted by the linguistic planes of phonetic, phonemic, morphophonemic, morphology, syntax, and perhaps onto further planes. The Eastern ideas of mantric and yogic use of language apparently grasped this pattern aspect of language. The explanation that language is an expression of thought does not explain the process of thinking. Whorf asserts that the forms of a person's thought are controlled by inexorable laws of patterns and these patterns are the "unperceived intricate systematizations of his own language."

The conscious or lower mind selects words but is in the grip of the patternment of the higher mind or "unconscious" which is based on the principles of each language. The bonds of the higher mind are unsensed and unbreakable. Thus, patternment overrides lexation, making sentences not words, the essence of speech in the same way equations or formulas--not numbers--are the real essence of mathematics. The higher mind deals with patterns of symbols that have no fixed meaning and even in the lower mind words are symbols whose referents must yield to patterns of sentences and syntax. A conflict between pattern and original lexical reference may bewilder the mind and alter perceptions to obviate the discontinuity.

Other languages such as Hopi, Japanese, and German have patterned aspects which may be more appropriate in the understanding of certain phenomena than English. These patterns control the perception and thinking of the societies that share them.

Glucksberg and Danks (1975, p. 178) summarize Whorf's hypothesis into two main assertions: Linguistic determinism maintains that language per se shapes thought and linguistic relativity asserts that languages differ in those ways that produce differences in conceptual development and modes of thought. They feel the mandate of linguistic determinism that language controls thought is too strong to be correct but that a weak form of linguistic determinism probably operates: "language influences thought, especially when we do not consciously avoid the restrictiveness of language." Diebold (1965) stresses that linguistic relativity implies one-way

directionality in the relationship between language and thought and that although many studies in concept formation imply such a directionality, it has never been conclusively demonstrated. Citing his work with primitive peoples, Boas (1974) concludes that the form of language is of minor importance only and that the language would not prevent a people from advancing to novel forms of thinking if the general state of their culture should require the expression of such thought.

Brown and Lenneberg (1954) supply some direct evidence of the effect of language on memory. They demonstrated that memory for colors was affected by the codability of the color. By codability they mean the extent to which any particular color has an agreed-upon short name. When a subject was shown a color chip that the subject described by a certain name, and then later was shown the same chip along with others, that the subject also called by the same name, some trouble was encountered in remembering which of the three had been previously seen. However, if the three chips were given very different names, even though the three did not differ widely physically, it was easier for the subjects to pick out the right color. Heider and Oliver (1972) performed a similar experiment with Dani and American subjects. The Dani have only two color categories, whereas the Americans have many. Their results differed from those predicted by the linguistic relativity hypothesis. The kinds of errors made by the two groups were very similar, yielding virtually identical subjective structures.

Perhaps the greatest problem with the Whorf hypothesis is pointed out by Bedau (1957). Bedau maintains that Whorf left his principle far from adequately formulated and that it could only be a major contribution to social science if further investigations yielded testable hypotheses. Perhaps this is the answer to Carroll's (1956) lament that very little research had been conducted on the Whorf hypothesis.

Ethnoscience

Sturtevant (1966) describes ethnoscience as a scientific methodology employed as a means of explicating the system of knowledge and cognition typical of a given culture. He feels that culture itself amounts to the sum of a given society's folk classification. Perchonock and Werner (1969) add that ethnoscience is concerned solely with classificatory principles as they are expressed by native speakers of the language, not as they are determined through anthropological observation. Ethnoscientists are interested in the speaker's knowledge of the various domains within the culture, not in actual behavior within the domains. The data of ethnoscience are linguistic utterances which reveal the speaker's knowledge of a particular culture.

Some basic principles of ethnoscience are described by Colby (1966). Perceived reality or the uniqueness of the moment is usefully distinguished from conceptualized reality which is the memory of a reality after perception of it has ceased. A lexical set is a group of contrastive words with a defining feature in

common or less rigorously defined as associations of words through common contexts or family resemblance. The word domain indicates the conceptualized reality designated by the lexical set. Folk science taxonomies and color are examples of domains. Sturtevant (1966) discussed the important concepts of "etic" and "emic" in relation to ethnoscientific research. Etic refers to classifications based on culture-free features of the real world such as the domains of color or plants. In contrast, an emic approach (which is the ethnoscientific approach) is an attempt to discover which characteristics of a phenomenon are significant in local classifications.

Perchonock and Werner's (1969) study of Navajo systems of classification is a good example of ethnoscientific methodology. They see the exclusive domain of ethnoscience as the study of classificatory principles as expressed by native speakers. Of chief concern is the enumeration of "folk taxonomies" which are defined as "models of analysis whose purpose is the description of particular types of hierarchical relationships between members of a given set of elements."

Methodologically, Perchonock and Werner reported that the question-and-answer approach in which trained informants were asked to formulate and answer their own questions was not useful. Informants encountered difficulty in formulating questions on a systematic basis.

More successful was the card-sorting technique. The informant was supplied with a set of cards containing names for Navajo foods and was asked to sort the cards into piles using any criteria desired. The name for the groupings and the basis for classification were elicited and the results were compiled into a tree diagram. The authors feel the card-sort technique presents two advantages: First, it gave the informant complete freedom to classify foods according to any principle desired, and therefore provided a way of getting at the different principles of classification beyond the stimulus of a specific set of questions. Second, it proved a comparatively rapid and simple method of eliciting classificatory tree diagrams. The facility with which people are able to produce taxonomies indicated to the authors the possible existence of a universal basic to the ordering of lexical domains.

The card-sort technique and subsequent construction of taxonomic trees revealed several properties of Navajo classificatory systems. It was demonstrated that taxonomies overlap either by superimposition of an entire section of one taxonomy on the subsection of another or by intersection of two distinct taxonomies, thus offering examples of the interrelationships of cultural domains. The principles used by an informant vary from the upper levels of the taxonomy to the lower with the intermediate level showing the most individual variation. Although informants produced different classification schemes, each informant, without exception, agreed to the correctness of another person's classification.

Though useful, the card-sort fails to reveal much potentially useful information. The authors resorted to a much more loosely structured procedure they referred to as "nondirected eliciting," which simply encouraged people to discuss a domain and tell the researcher anything the informant thought important. This method illuminated taxonomic relationships, processes and value orientations within the selected domains.

Folk taxonomies

The major concern of ethnoscience has been the enumeration of what have been called "folk taxonomies." Taxonomies, according to Perchonock and Werner (1969, p. 229), are ". . .models of analysis whose purpose is the description of particular types of hierarchical relationships between members of a given set of elements."

Brent Berlin and his associates have been exceptionally prolific in their analysis of folk taxonomies. In a series of papers these authors describe in detail the regularities of hierarchical ordering and linguistic attributes of taxonomies produced from their work with the Tzetal and Aguaruna and from folk taxonomies reported in the literature.

In a 1969 paper and in a 1973 paper (Berlin et al., 1973), Berlin and associates describe principles which they deem to be universal to classification and nomenclatural processes in folk science. In these papers, Berlin extracts four major generalizations from data collected by field researchers on the nature of folk taxonomies. The first generalization is ". . .the imperative

need of man to order his natural universe into some understandable system" (Berlin, 1969, p. 1). Groupings of organisms occur in nature and societies recognize these groupings with overt linguistic categories.

The second generalization states that the nomenclatural principles used in linguistic designation of natural groupings are essentially identical in all languages. Most plant or animal names fall in one of two classes. One class, the generics, are usually single-word expressions which are semantically unitary and linguistically distinct. The second class contains variously modified members of the first class. These classes are recognizable on linguistic, taxonomic and psychological grounds. Linguistically, generics are unitary lexemes and nongenerics are composite lexemes. Taxonomically, the smallest groupings of plants or animals are generic taxa. Generic names are very important psychologically and are easily elicited from native informants. Specific taxa are usually formed by the addition of a modifier to the generic term to form a binomial. Often the generic is thereby partitioned in contrast sets of two categories. Contrast sets with more than two members reflect groupings of high cultural significance.

A third generalization regarding folk taxonomies is the observation that most folk taxonomic structures are shallow. Most folk taxonomics are composed mainly of generic and specific terms with few inclusive superordinate taxa. Covert midrange taxa have been demonstrated in some classifications.

The fourth generalization is a tentative hypothesis on the growth of folk taxonomies in a language. That is, at least four ethnobiological categories may ultimately exist--generic, sub-generic, supra-generic, and unique beginner--and these are encoded into a language in a specific order. This may provide a basis for classifying language in terms of the number of ethnobiological categories which have become encoded in the language. This last generalization Berlin develops at length in a 1972 paper entitled "Speculations on the Growth of Ethnobotanical Nomenclature." In this paper, Berlin reiterates the primacy of generic taxa as the first ethnobiological categories to become encoded in a language's plant lexicon. Expansion of the taxonomy appears to be horizontal at first and then develops by differentiation and generalization. The six major categories of plant taxa appear to be encoded in the language in the following order: generic, life form/specifics, intermediate/varietal and unique beginner.

In a 1968 paper entitled "Covert Categories and Folk Taxonomies" by Berlin et al., the authors present evidence of unlabeled "covert categories" in Tzeltal plant taxonomy. Traditionally, individual taxa of folk taxonomies have been required by definition to be monolexemically labeled. In Tzeltal, there is no named unique beginner, the highest level being represented by four major plant-class lexemes which include approximately 80 percent of all Tzeltal plant names. At the same level there occur minor coordinate classes judged unusual by morphological criteria, for

example, epiphytes, cacti, agaves and bamboo. These classes contain all of the subordinate Tzeltal specific taxa; there is, however, a salient paucity of lexemically labeled midlevel categories.

Using a slip-sort method which included both plant and animal names, the authors easily demonstrated the recognition by Tzeltal informants of unnamed unique beginner categories. Informants had no difficulty in grouping plant names into the major Tzeltal plant classes. Significantly, informants further grouped plant names into unnamed subgroupings as predicted by the authors' hypothesis. Having demonstrated the significance of such subgroupings, the "psychological saliency" of the classifications was demonstrated through the combined employment of the triads-test, folk key construction by informants and paired comparisons.

Brown (1974) criticizes Berlin's assertions of the existence of covert categories in folk taxonomies, particularly the method used to demonstrate the existence of such categories. Brown feels that the slip-sort and other methods employed by Berlin present informants with culturally irrelevant options which coerce them to sort items together which they would rarely group together on an "ordinary day-to-day basis." The sorting on the basis of morphological similarity is also suspect as it may not represent ordinary perceptions of the items involved.

A variant of the Berlin paradigm is reported for some language neighbors of the Great Basin. Trager (1939) notes an interesting

effect of environment on a number of native southwestern languages. In the southwestern United States the dominant deciduous tree along every watercourse is the cottonwood (Populus angustifolia, P. acuminata, P. sargentii and probably others). Several languages in the area, therefore, identify linguistically the concept "cottonwood" with that of "(deciduous) tree." Although Trager notes that many of the Uto Actecan languages use a specific term for cottonwood and a general term for tree that are different, the Hopi language, which is related to Shoshonean languages, uses the same term for both.

This polysemy between generic and specific names has also been noted by Hage and Miller (1976) in their study of Shoshoni ethno-ornithological nomenclature. In this case kwinaa (Golden eagle) is polysemous with the life-form label which represents the taxon "bird." The elevation of kwinaa to life-form status is consistent with Trager's (1939) assumption that a dominant species may be used as a generic term. It is also consistent with Berlin's (1972) thesis that generic terms which designate "culturally salient" categories may be elevated to life-form status. The Golden eagle is culturally salient in the sense that it is relatively abundant and because of its size, highly visible when present. Not consistent with Berlin's theory are the named intermediate categories which are the source of the life-form label. Berlin (1972) predicted that intermediate categories would usually be unnamed and be the result of cultural contact situations or would occur when a specific taxa becomes

conceptually distinct from related specifics and the original generic term elevated to an intermediate.

Randall (1976) expresses doubt that taxonomic trees really represent the way in which information is stored in the memory. Taxonomies require a transitive logic, that is, an item is a member of a category which is a member of a larger category and so on. For example, a black oak is a kind of oak which is a kind of tree which is a kind of plant. However, Randall finds many examples of nontransitive logic in common usage. Thus, oak is a kind of tree but scrub oak is a kind of shrub. Likewise, berry is a kind of bush; strawberry is a kind of berry but strawberry is not a kind of bush. Randall found similar examples in his work with the Samal. He concludes that the common occurrence of these nontransitives may be evidence that people do not routinely use transitive reasoning and therefore the multilevel taxonomy model should be discarded. He suggests instead that memory contains configurational images of typical types. In order to determine if scrub oak is tree-like, the two images could be recalled from memory and compared. If such configurational images existed, it would be comparatively easy for an informant to answer the usual type of hierarchically-framed question, even though the knowledge is not stored in this way. Nonconfiguration characteristics such as use and "ecozone location" could be stored directly in relationship with various categories. When taxonomic relationships are used for storage, they would be considerably shallower than the

extensive multilevel taxonomies usually posited.

In conclusion, Randall states:

> Instead of consciously systematizing, most people tackle a different task. It seems to me that the important classification problem routinely facing intelligent humans is to operate adequately in a physically-demanding, complex, and often dangerous socioecological environment. Doing this does not involve constructing taxonomic trees, but rather, in a particular situation, selecting a contrast set of characteristics which is both sufficiently specific to achieve a practical and safe result and sufficiently general to accomplish one's purposes efficiently. (Randall, 1976, p. 552)

Holmgren and Reveal's (1966) Checklist of the Vascular Plants of the Intermountain Region and the 1972 edition of Holmgren's Vascular Plants of the Northern Wasatch were used extensively in this study as sources of botanical identification and taxonomic relationships. In addition, Kirk's (1975) work on wild edible plants was used as a reference to check the use potential in terms of edibility of various plants in the Great Basin.

The Shoshonis

The Shoshoni language is part of the Numic branch of the far-flung Uto-Aztecan family of languages. The Numic languages contain three subdivisions: Western Numic (Mono and Northern Paiute), Central Numic (Shoshoni, Comanche and Panamint), and Southern Numic (Kawaiisu, Chemehuevi, Southern Paiute, and Ute) (Crapo 1976). Madsen (1975) traced the expansion of Numic speakers throughout the Great Basin about A. D. 1000-1300, citing both linguistic and archaealogical evidence. The three Numic branches fanned across the Basin beginning from an area around Death Valley,

California. Madsen suggests that both Fremont and Paiute-Shoshoni groups occupied the same Utah-Nevada border areas and many of the same sites for a 100-200-year period and that competition with Numic-speaking groups may have been an important factor in the disappearance of the Fremont culture.

The most important work on the Shoshonis and neighboring language groups is the monograph entitled Basin-Plateau Aboriginal Sociopolitical Groups published by Steward in 1938. Steward describes in detail the hunting and gathering life style and the reduced social organization which was dictated by the parsimonious environment of the Great Basin. The Shoshonis lived as members of a biological family which was an independent, self-supporting unit. The family was bilateral rather than patrilineal or matrilineal because associations were variable and extended families too large to be supported in the harsh Basin environment. No localized lineage or clan developed, no bands, and political organization was minimal. Sometimes grandparents or the spouse of a child was included in the basic family unit. The old and infirm cared for the children, but in times of imminent starvation, the old and infirm were abandoned. The average size of a household was six and at times as many as ten. Polygamy occurred occasionally when a man had sufficient wealth to support more than one wife. Polyandry usually resulted from the extension of sexual privileges to a brother. Families were frequently disrupted by divorce or wife abduction. Exogenous marriages were an important means of

strengthening friendly ties with neighboring families.

Fowler (1964) feels that Steward's emphasis on the nuclear family as the basic socioeconomic unit is unwarranted. Although the nuclear family was the focal point of a group of related persons, it was often augmented with grandparents, additional spouses or friends. Fowler would prefer the term "kin and clique," which is also used by Malouf (1964). The kin and clique had no compulsions which gave it a permanent identity but was composed of a number of bilateral relatives joined by friends or acquaintances.

Subsistence was based primarily on plant foods. Group endeavors in harvesting did not increase the per capita harvest so there was usually little opportunity for interaction between families much of the time. Both men and women would hunt rodents, insects and other small animals and the men from different families would, at times, get together for group hunts of rabbit or antelope (Fowler, 1964). At such times a temporary leader who had particular skills or shamanistic powers would be designated. Plant foods included seeds, roots and pine nuts which were gathered and stored for winter and greens, leaves, stems, berries and roots were collected and eaten in season. Malouf (1964) estimated that an area at least 100 miles in diameter was covered by some groups in the seasonal quest for food. Steward (1938) reports a total of 172 species or varieties of plants used by various Basin groups.

Downs (1964) shows evidence that almost every Basin group examined employed some environmental manipulation, planning or

alteration to improve food yields. Actual agriculture was used by some groups in the southern portion of the Basin. Three proto-agricultural practices were found sporadically throughout the Basin. The least widespread was the practice of irrigating wild crops by the diversion of streams reported from the Owens Valley area. More widespread was the practice of sowing wild seeds. This was reported throughout Nevada, including seven of 19 groups studied by Steward (1941). Even more common than sowing seeds was the practice of burning to encourage growth of wild plants. This is reported for 15 of the 19 groups covered by Steward (1941).

The Shoshoni religion was essentially Shamanism based on individual powers which were obtained from spirits. The powers were used by the shaman for himself (such as on a hunt), for another individual (such as a curing rite), or for the group (as on a drive or as leader of a group ceremony) (Malouf, 1964). Interestingly, much religious effort was directed towards hunting rites, although hunting was much less important than the acquisition of plant foods to which little religious attention was devoted. Sickness was another major concern of religious rites. The shaman was the only true specialist in Shoshoni society (Steward, 1938).

Because of the low level of social organization and the high degree of self-reliance required for existence in the Basin, the Shoshonis were strongly individualistic (Malouf, 1964). Politically their thinking was not extended beyond a small group and with few exceptions there was little need or opportunity to submerge the individual's wishes to the desires of a larger group.

Recent works on the Shoshoni language include Miller's (1972) Newe Natekwinappeh: Shoshoni Stories and Dictionary and Crapo's (1976) Big Smokey Valley Shoshoni. Miller's work contains phonemic transcriptions and English translations of stories told by several Shoshoni speakers. It also contains a brief dictionary of Shoshoni words. Miller's phonology was followed in the present study. Crapo's work is the most recent and comprehensive dictionary of Shoshoni terms. It reflects the dialect of the Big Smokey Valley Shoshoni and contains notes on phonology and grammar which generally follow Miller's (1972) analysis.

STATEMENT OF THE PROBLEM

There are a number of examples in the literature of the production of folk taxonomies by various cultural groups. As Berlin (1973) observes, these taxonomies are remarkably similar in design and may reflect universal principles of classification. They have a predictable size and depth and follow certain linguistic rules. A striking feature of most of the taxonomies published is that they are based on a single criterion and invariably that criterion is the similarity of the items in a particular domain in terms of form or morphology. Berlin (1969) sees such taxonomies as reflecting objective regularities and discontinuities in nature and that " . . . it is inevitable that overt linquistic recognition be given naturally-occurring groupings of organisms of the biological universe." Kay (1971) sums the general feeling of most researchers in the field as follows:

> The initial discoveries in the modern era that extensive and precise taxonomies exist among illiterate primitives originally occasioned surprise bordering on incredulity in some quarters. But it is increasingly recognized that the similarity to Linnean taxonomy of the folk taxonomies discovered by ethnographers and ethnobiologists need not cause surprise, since Linnean taxonomy is simply the particular folk taxonomy with which Western Europeans are most familiar. Linnaeus did not invent the principles of taxonomy; he simply employed, and made explicit, those which were implicit in his own culture--which, as it turns out, for the most part represent universal principles of classifications and nomenclature, found in all human culture and languages. (p. 867)

It is clear that most researchers in ethnoscience feel that they have discovered a fundamental psychological universal, that is, the ability of people to construct a heirarchical taxonomy based on the similarity of items in a particular ettic domain. This assertion produces many problems which would be of interest to social scientists, in particular, questions regarding the social context of domain classification. How, for example, do cultural classifications relate to classifications made on purely objective grounds of morphological similarity? When Berlin (1968, p. 293) asked his informants to sort plant names into groups that are "most like one another," he found that classifications were made uniformly on the basis of similarity. When Perchonock and Werner (1969, p. 230) gave an informant ". . . complete freedom to classify foods according to any principle he saw fit. . ." they found that different taxonomies were produced that overlapped and that within a single taxonomy, different classification criteria were employed. Might not multiple criteria for classification exist based on culturally salient factors as well as on morphological factors? If such multiple classifications exist, it would be expected that they would in some way be reflected in language. The Whorf hypothesis would predict that such categories would tend to dominate other classifications which were not encoded into the language to the same extent.

How well do taxonomic "trees" reflect the way people perceive their environment and store those conceptualizations in the memory?

Wallace (1962, p. 353) states that the study of such taxonomies will ". . . reveal the structure of the logical calculus. . . ." Berlin (1969) clearly feels that taxonomic trees reflect individual conceptualization and cites the research of Bulmer, Conklin and others. Randall (1976) disagrees with the majority view by pointing out that taxonomies require a transitive logic which is not consistently supported by data. Randall would opt instead for a paradigm in which classifications are made either by directly stored associations of characteristics or a comparison of prototypic images.

The major thesis of this study is that multiple classification schemes for a given domain coexist and that these schemes will not be conceptualized solely in terms of taxonomic relationships. It is hypothesized that informants will use at least two criteria for classifications of plants: morphological similarity and cultural utilization, and that these classifications will overlap and compete with each other. This overlapping of classifications will disallow the assumption of transitive logic which is basic to a taxonomic theory of conceptualization and therefore indicate the necessity of an alternative paradigm for human memory storage.

METHODS

Personal interviews were conducted with Shoshoni-speaking people who were familiar with plants traditionally used by their families. The interviews were informal and structured only by the use of the card-sort technique described by Perchonock and Werner (1969). The card-sort technique employed 3" x 5" index cards containing plant information gleaned from the literature. When the information was available, each card contained a phonemic transcription of the Shoshoni name, the scientific name, English common name or names, a numerical identifier, and any other data that was available and pertinent.

At the beginning of the interview, each card was examined by the informant to assess familiarity with the plant names. Any cards with unfamiliar plant names were deleted and new cards were filled out for plant names which occurred to the informant and which were not already in the deck. Plant names acquired in this way were added to the complete deck for future interviews. Informants were also asked about the way that the plants were used and responses were recorded in a notebook opposite the card number and recorded on tapes for transcription.

The informants were then asked to sort the cards into groups on the basis of similarity. To get the idea of what was wanted, the informant was shown a copy of the Shoshoni ornithological

taxonomic tree published by Hage and Miller (1976). At the completion of the task, the interviewer listed the contents of each group, the Shoshoni name for each group, if any, and sketched a diagram of the relationships of the groups.

The informant was then asked to resort the cards into groups based on how the plants were traditionally used by the Shoshoni people. The interviewer recorded the results of this task in the same manner as the first sort.

Within the first 7 or 8 hours of interviewing, it became apparent that the informants' resistance to the card sort on the basis of these criteria dictated a change in approach. It was extremely difficult for the informants to classify the plants strictly on morphological criteria without being influenced by the way the plants were used. During the card sort based on similarity, the informants would repeatedly make comments such as ". . . this is a food so I'll put it there. . ." or ". . . this is a medicine so I'll put it over here. . . ." The interviewer would remind the informant that this time the cards should be sorted on the basis of how much the plants look alike and the informant would reclassify the plants accordingly. There was also some resistance encountered on the sort based purely on use but not to the extent experienced on the similarity sort. Because of these problems, the interviewer began simply asking the informants to sort the plants into groups in any way that seemed natural. In most cases, the criteria used by the informant to group the various plants was obvious from the

name given to the groups. For example, it was clear that the informant had the use of the plants in mind when a group was referred to as "foods" or "medicines." When there was doubt about the criteria used in the classification, the interviewer queried the informant as to the basis for the grouping. These changes greatly simplified the interviews and decreased their length substantially and clearly were more representative of the informants' own ideas about how the plants should be classified.

Another innovation, suggested by Crane and Angrosino (1974), was employed during the course of the interviews. Whereas the method described to this point has directed informants to proceed in classification from specific plants to general categories, the reverse was also attempted. Informants were asked if there were names for groups of plants, for example, "Is there a name which could refer to all plants such as the word 'plant' in English?" or ". . . were some plants grouped together because they look alike or were medicines or food?"

At the completion of the sorting tasks, the interviewer instructed the informant to reexamine each plant name and determine if the names, attributives or morphemes have a literal meaning. Responses to this task were recorded in writing and on tape as required.

Where time allowed at the end of an interview, informants were asked to name as many parts of plants as possible. This was done by referring to preserved plant specimens and plant reproductions and tape recording informants' responses.

Since the interviews tended to be lengthy, some informants were interviewed on more than one occasion in order to complete the tasks. Return interviews also allowed the interviewer opportunity to clear up any problems which may have arisen during analysis of the data from previous interviews.

At the completion of the interviews, a number of lists, tables and figures were compiled to summarize the data. A list of plants was compiled for which uses were indicated by the informants. Plant-related terms, and terms relating to plant parts, were also compiled. The results of the card sorts were diagrammed to display taxonomic relationships for comparison of taxonomies based on morphology and use and to facilitate comparisons among informants.

Much information was gathered which was not the result of a formal card sort but was obtained through questions about the details of plant classification and conceptualizations. To summarize this data, a list was compiled of all terms which were used to denote categories which contained two or more plants or other categories. Beside each term was indicated the number of informants who used the term. This list was then condensed to contain only terms which reflected minimal concensus among the informants, that is, terms used by two or more informants. The relationships of these terms to one another was derived from a careful review of the information from all of the informants and this relationship was displayed diagrammatically. Plant names were then placed with

the general terms to reflect the greatest amount of agreement possible among the informants.

RESULTS

Appendix A is a compendium of the way plants were used by some of the Great Basin Shoshoni as reported by the informants in this study. Plants are arranged alphabetically by their English botanical designation. In some cases, it was not possible to accurately determine the plant species to which the informant referred. In such cases, only generic names are given. Following the botanical name an English common name is listed and then the Shoshoni name or names.

A list of Shoshoni names which relate to plants and plant uses may be found in Appendix B. The names are listed alphabetically by the Shoshoni name.

Appendix C is a comprehensive list of all the plant names used in this study, listed alphabetically in Shoshoni. When known, common and botanical names in English are given. This list was compiled from Miller (1972) and Crapo (1976) as well as from the informants in this study.

Appendix D contains the taxonomies and fragments of taxonomies which are the results of the card sorts performed by several of the informants. In general, most informants willingly performed the sort but had difficulty sorting either on the basis of plant similarity or on the basis of plant utilization alone. Some informants resisted the card-sort technique as too difficult or

irrelevant. In all, eight card sorts were performed by seven of the 10 informants interviewed. Taxonomies Ia and Ib were compiled from card sorts performed by one informant using first the criterion of plant similarity and then the way the plants were used. The card sort for Taxonomy II was based on similarity of the plants. The informant who performed this sort flatly stated that Shoshonis would not categorize plants in this manner.

Because of the resistance encountered on sorting separately for similarity or for use, subsequent informants were asked to sort the cards in any way that seemed natural. Taxonomies III through VI, therefore, reflect card sorts based on criteria selected by the informant.

The taxonomy depicted in Figure 1 (Taxonomy III) has been selected for closer scrutiny. It was produced by the oldest informant in the study with the assistance of her daughter. The groupings were based on how the informant felt the plants should be grouped rather than only on similarity or use. The taxonomy contains four levels: intermediate, life form, generic, and specific. Tekappeh is a normal intermediate and is contrasted with an unnamed or covert intermediate. Included in tekappeh are six life forms which are further divided into generics. In the case of pokompih, three specifics are listed: ainka, oha, tuupokompih. Four generics--hepin, natsu, sonippeh and sohopin--are not included in tekappeh. In the cases of pokompih, sanakoo, sonippeh and sohopin, the life form term has been derived from a generic and is polysemous with it.

Intermediate	Life Form	Generic	Specific
tekappeh	soko teta	kenka	
		sikoo	
		yampa	
		sokotsiina	
	tepa	tepa waapin	
	pehe	hukkan	
		atsix	
		akken	
		poina	
		hiyampeh	
		piakken	
	puitekappeh	wokaipin	
		pamun	
		poko	
		kenka	
	pokompih	pokompih	ainka pokompih
		teampih	oha pokompih
		teyampe	tuu pokompih
	sanakoo	sanakoo	
		sipa"pin	
		pohopin	
	hepin	pakwana	
	natsu	tasippeh	
		newe nokko	
		pohopin	
		sipa"pin	
	sonippeh	sonippeh	
		pia sonippeh	
		puippeh	
		puisonippeh	
		pahon	
	sohopin	sohopin	
		sehepin	
		sanawaapin	
		waapin	
		kuniappeh	
		kettehupin	

Figure 1. Taxonomy III, a taxonomic representation of a card-sort of Shoshoni plant names depicting four levels of taxa.

Sipa"pin and pohopin are classified as sources of sanakoo (gum) and also as natsu (medicine). Likewise, kenka is placed under soko teta and puitekappeh. Worthy of note is the consistency of word endings in sonnippeh and sohopin. All end with the same suffix as the life form with the exception of pahon and kuniappeh. Also noteworthy is the prevalence of monolexemes at the life form and intermediate levels. This monolexemic labeling contrasts sharply with the wordy generic phrases of Taxonomy Ia and Ib (see Appendix D).

An attempt was made to summarize all of the data in such a way that it would contain as much information as possible and at the same time reflect as high a degree of consensus among the informants as possible. Table 1 shows the beginning of this summary process. The table is a list of all terms which the informants used to label categories of plants. The number indicates the number of informants who used the term in the same way. The term is followed by a brief description of how it was used. In most cases the terms were volunteered as names for plant groups in the card sort or in answer to questions such as "How would you refer to all trees?" Tsaan and kaitsaan were volunteered by the first informant to designate plants which were useful to the Shoshoni and those which had no use. The next informant was asked if she agreed with that use of tsaan and kaisaan and answered affirmatively. It was felt that this solicitation of agreement on particular terms might bias the amount of consensus upward, as some informants may not wish to disagree with the interviewer. Consequently, terms for groups were not

Table 1. Number of informants using various generalized terms to describe plant groups.

General terms	Number of informants who used the term	English gloss
kettehuppin	4	hardwood, maple, mahogony
pokompih	4	any kind of berry or berry bush
puippeh	4	grass
sohopin	3	any tree, including deciduous and conifers
natsu	7	medicines
tekkappeh	4	foods
tsaan	2	all useful plants
kaitsaan	2	all nonuseful plants
sokotsiina	1	plant with edible roots
tan-kahni-nai-nee	1	willow, wild rye, grass
sohopin kotto tui	1	trees for burning
tapoon sohoppeh	1	walnut, pine nut tree
soko-kuppantan tepi tsaanteppeh	1	plants that grow on/under the ground
puippeh	4	weeds, plants
wakaipin	4	any cactus
puitekkappeh	2	green foods
natsusohopin	1	medicine sage, rabbit brush
sohotekkappeh	1	plants that grow on/under the ground
puisonnippeh	3	hay--includes alfalfa, grasses
sonnippeh	5	piasonnippeh, puippeh saippeh
hepin	1	tea
pehe	2	seeds
tepa	1	pine nuts
soho teta	1	root foods
pokompih	1	red, yellow, black currant
poho (pin)	2	all brush, sage, rabbitbrush
akken	2	toya-, piakken, kusi- sunflower
sohopin	2	deciduous trees only
sehepin	1	willows, vines
waapin	1	evergreens
pahon	3	tobacco
sohopin	1	may mean all plants

Table 1. Continued

General terms	Number of informants who used the term	English glossary
waapin	1	any kind of pine tree, not juniper
waapin (also pui-waapin)	2	forest, any kind of tree
(pui)hepinkeppeh	3	green flowering plant
waapin	1	pine, junipers, not high mountain trees (e.g., fir, spruce)

suggested by the interviewer but an attempt was made to elicit the terms spontaneously through questioning. In subsequent interviews the terms tsaan and kaitsaan were not volunteered by any of the informants. Not suggesting names for categories had the possible disadvantage of underestimating the degree of consensus. If, for example, an informant would have given a particular term used by the other informants but simply could not recall the terms, the consensus on that term would be underestimated.

Table 2 was condensed from Table 1 by listing all terms which reflected a minimal degree of consensus, that is, at least two informants used the word in the same way. The terms tsaan and kaitsaan were dropped because of the dubious degree of consensus on them. Note the high degree of consensus on natsu (medicine). Seven of the 10 informants used the term natsu to describe a particular group of plants. Puippeh was used in two slightly different ways but was used by a total of eight informants. The Shoshonis from the north tended to use sohopin to mean all trees, whereas those from the south tended to use waapin for all trees or waapin for evergreen trees and sohopin for deciduous trees.

The terms in Table 2 and the context that they were used in reveal at least two major criteria for classification: first, the degree to which the plants look alike (sohopin to designate "treeness"), and second, the way in which the plants were used, for example, natsu (medicines). Because of the existence of at least two major classification criteria and because the meaning of

Table 2. General terms used by informants on which there was a minimal amount of consensus.

General term	Number of informants who used the term
kettehuppin	3
pokompih	4
puippeh	4
puippeh	4
sohopin	3
natsu	7
tekkappeh	4
wakaipin	4
puitekkappeh	2
puisonnippeh/punkutekka	3
sonnippeh	5
pehe	2
poho	2
akken	2
sohopin	2
poho	3
waapin	2
pui hepinkeppeh	3
soho teta, tsiinaa	2

many of the terms overlap, the compilation of the terms into conventional taxonomic tree proved unwieldy. A modified Venn diagram was used to present the data in a more meaningful way. Figure 2 is one way in which the data may be summarized and displayed. The terms in boxes were taken from Table 2 and are the collective names for the sets of items within their respective circles. The relationship between these terms and the contents of the sets were derived through carefully analyzing their context and selecting relationships which reflected the largest degree of consensus among the informants. Since there was disagreement on some terms and relationships, Figure 2 is by no means the only way the data could have been interpreted. Circles within circles represent named subsets of the larger set. For example, wokaipin is a subset of puitekkappeh. Terms in areas of circles that overlap are conceptualized as members of both sets. Note, for example, that kenka, moontsih (onion) may be classified as a kind of puitakkappeh (green food) as well as a sokotete (root). Dotted lines indicate items which have weak conceptual associations. In this relation, hepinkeppeh presents a special problem because it represents a transient state. The Shoshonis in the study tended to use the term to refer to low-growing plants in flower.

Although not frequently reflected in the language, a third conceptual category became evident during the course of the interviews. Some informants mentioned the grouping of plants in terms of geographical areas. At least four geographical areas can

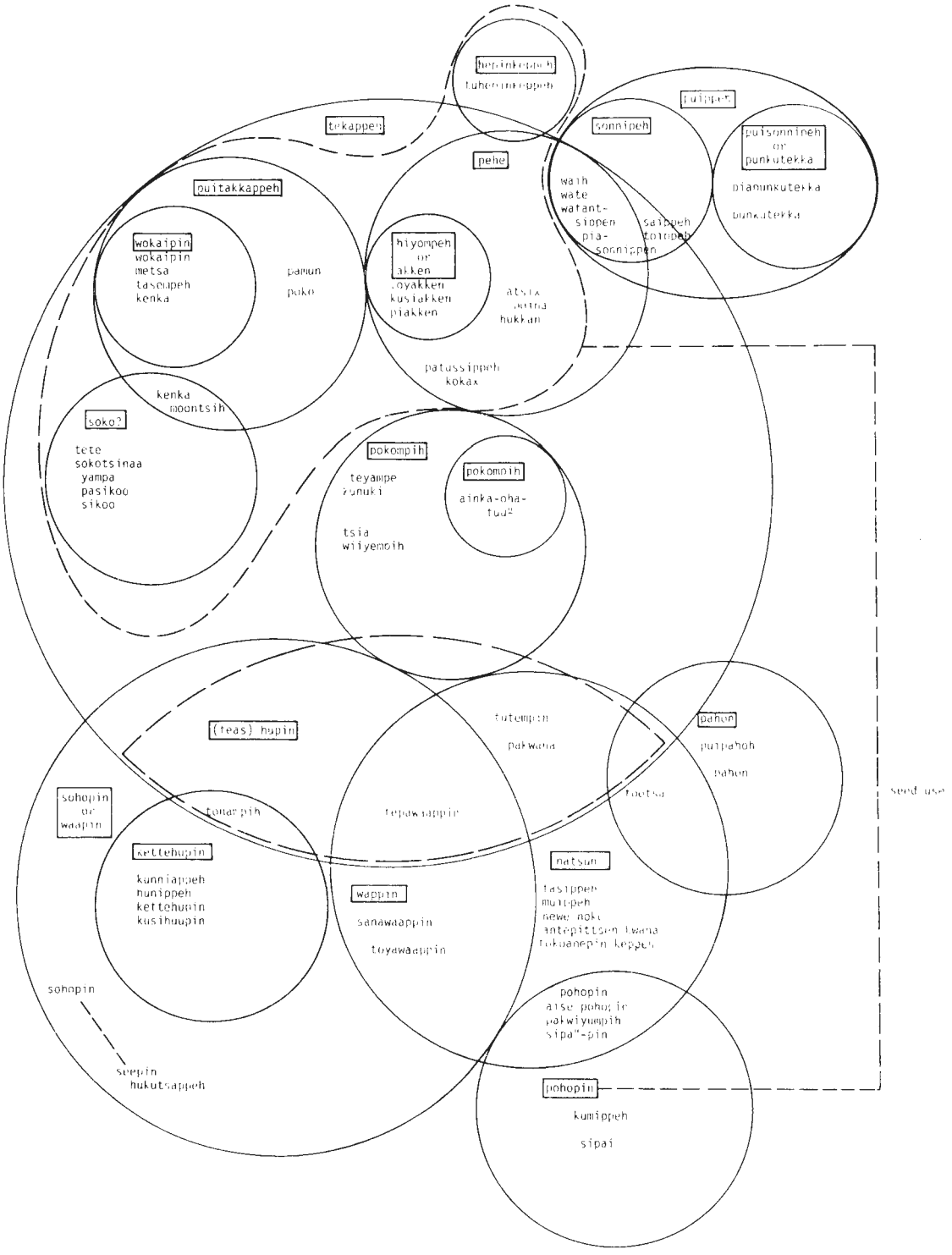

Figure 2. Diagrammatic representation of how Shoshonis in this study might conceptualize certain plant relationships.

be discerned: high mountain, low mountain and foothills, areas along water courses, and desert. Ideally then, Figure 2 would be extended in a third dimension to represent this additional factor.

Notwithstanding the implications of the above data, the growth habit of plants appears to have been the major factor in the development of plant names. An analysis of plant name suffixes yields three major ways that plant names are ended. Names without suffixes usually characterize species of plants which are herbs, that is, plants with no persistent woody stems above ground. The suffix "-ppeh" is used for plants which are low growing and form dense stands or masses such as grass (sonnippeh) or shrubs like tasippeh (Ceanothus velutinus). The "-ppeh" suffix may be roughly equivalent to the English suffix "-ness." Words ending in "-pin" are used to denote shrubs or trees with persistent woody stems.

DISCUSSION

Many of the general principles of classification and nomenclature described by Berlin et al. (1973) seem to apply to Shoshoni folk biology. Of the "taxonomic ethnobiological categories" mentioned by Berlin, intermediate, life form, generic and specific terms were used by the informants in this study. As predicted, the most numerous terms are the generics and are represented by unitary lexemes such as kenka, sikoo, and yampa. Specifics are formed by adding an attributive which results in composite lexemes such as ainka pokompih (red currant). Life form taxa are few in number and in some cases are derived from the category they name. Examples of polysemy noted by Trager (1939) with sohopin (cottonwood) and Miller (1976) with kwinaa and huitsuu are also found in Shoshoni botanical nomenclature. Pokompih, sanakoo, sonippeh, sohopin and waapin are used both as life forms and generics. Tekappeh appears to fulfill Berlin's criteria for a named intermediate but it is not clear whether it is contrasted by an unnamed intermediate category. It is doubtful that other categories not subsumed under tekappeh are conceptualized as "non"-tekappeh. Although attempts were made to elicit a unique beginner equivalent to the English term "plant," the lengthy names and lack of consensus by the informants seem to indicate that the unique beginner is unnamed.

Although the nomenclatural processes of the Shoshoni informants in this study show some agreement with those mentioned in the literature, the production of taxonomic relationships contrast sharply. The taxonomic trees reported in the literature display ethnobiological categories hierarchically arranged with mutually exclusive taxa assigned to each rank. Each taxonomy invariably employs a single criterion for discrimination between categories and that criteria is usually morphology. In contrast, the Shoshoni informants found it extremely difficult to classify items using a single criterion. In the early interviews in which the informants were asked to sort plant names only on the basis of similarity, it was necessary to continually remind the informant to use only the single criterion.

In later interviews where the informants were allowed to sort on any criteria they desired, the results were overlapping categories based on a variety of criteria. Four classification criteria were used by informants in this study: morphology or similarity, cultural utilization (use), geographic setting, and growth habit. The results of this study indicate that morphology is a very fundamental and important consideration when classifying, and it is frequently relied on when naming or categorizing aspects of a particular domain. Morphological classification is etic in the sense that it is objective and may be perceived by individuals despite their cultural background. Indeed, given sufficient motivation, most people can group items such as plants on the basis of similarity even though

they were not previously familiar with the items to be classified (Randall, 1976). Informants in this study classified berry plants, trees and grasses apparently on morphological similarity. Note, however, that in the case of berry plants, the characteristic chosen to be morphologically significant is a part of the plant which is culturally significant. The plants characterized generally as pokompih all produce edible berries but they are not the only plants known to the Shoshonis that produce berries. Ainka kuneaippeh (redosier dogwood) is usually grouped with seepin in the category of sohopin although it produces a cluster of white inedible berries. The attributive ainka (red) undoubtedly refers to the red-barked stem which is admittedly perceptually salient but also culturally important in that dogwood stems are used with willow stems in basket making. Likewise, tasippeh (Ceanothus velutinus) produces a berry. However, it is not considered a berry but a natsu or medicine. The word pokompih (currant or berry) was used by all the informants in the study to refer to the whole plant even though Miller (1972) reports pokonoppeh as the Shoshoni name for "currant bush." This use of a name for a culturally important part of a plant to refer to the whole plant has parallels in English folk taxonomy. Carrots, beets, peas, beans and so forth all refer to the edible part of the plant as well as the plant as a whole.

It is clear from the classification made by the informants in this study that the way in which plants were used by the Shoshonis profoundly influenced their perception and classification

of plants. Not only were some plants grouped together on the basis of culturally salient morphological criteria, but some plants were grouped totally on the basis of cultural criteria. The category natsu (medicine), for example, contains such morphologically diverse plants as Ceanothus, Datura and Artemesia. It is also clear that taxonomies based on morphology and on use are not conceptually isolated in the minds of the informants. Were this the case, card sorts based on either of the two criteria would have been easily performed by informants. The results show quite the contrary. All of the informants used multiple criteria as the basis for classification.

Several of the informants mentioned that they felt the setting in which the plant is found is important. The setting entailed both the proximity of other plants and the geographical location. This criterion is not often reflected in language. Toya is a prefix indicating mountain and is sometimes used as an attributive, as in toyawaapin (literally mountain evergreen) and toyakken (mountain sunflower). The prefix pa- may indicate a moist habitat as in pakwana (mint) or pasikoo (camus). The geographical setting of a plant may be a natural way to conceptualize plants at various times but precedence in naming and classification apparently is given to other criteria.

The finding that plant name suffixes are related to plant growth habit is as unexpected as it is interesting. The Whorf hypothesis would predict that the encoding into a language of a scheme of

classification based on a particular criterion would tend to force the bearers of the language into that particular mode of classification. Plant growth habit, however, seemed of only minimal importance to the informants in this study. Note, for example, the mixture of words with "-ppeh" and "-pin" endings within the sohopin/waapin set (see Figure 2). The most consistent considerations of growth habit is in the term puippeh which may be glossed roughly as "low-growing greenness." As used by the Shoshonis in this study, puippeh refers to grasses, alfalfa and any low-growing green plants but not shrubs or trees. Apparently the early Shoshonis included low-growing shrubby plants into the "low-growing greenness" category as well. Tasippeh (Ceanothus velutinus) and kunniappeh (scrub oak) carry the "-ppeh" suffix and grow close together. The important criteria for the "-ppeh" ending is that the plants form low, dense stands or mats.

There is an interplay between words with the "-ppeh" ending and words without a suffix which may be culturally influenced. In some cases where a grass has a particular cultural use such as a source of seed, the "-ppeh" ending is lacking. Examples are waih and wate which are grasses and would be expected to carry a "-ppeh" ending. Another example is the two names given to alfalfa. Puisonippeh carries the expected ending; however, punkutekka, which literally means "horse food," indicates, by its name, a use and drops the "-ppeh" ending.

Probably the existence of a particular cultural use for a plant singles it out perceptually so that it is no longer thought of in the general "low-growing greenness" sense.

The results of culture contact between Shoshonis and whites seem apparent in the present inconsistencies of word endings. The old Shoshoni conceptualizations of herbs, low-growing greenness and tree-like plants is giving way to the English folk taxonomic categories of weeds, grass, shrubs, and trees. Since English folk botany prohibits grouping shrubs such as Ceanothus and scrub oak with grasses, the Shoshonis now have removed them from the puippeh category and placed them in the sohopin/waapin (tree-like) category. Many of the herbs which were important to their ancestors for food are now considered as weeds by modern Shoshonis in their roles as farmers, ranchers or gardeners.

The existence of multiple criteria for the classification of items in a domain raises serious questions about the taxonomic nature of the classification. By definition, a taxonomy must contain mutually exclusive categories which are arranged hierarchically (Berlin et al., 1973). A casual examination of any of the "taxonomies" produced by the informants in this study reveals numerous contradictions to the definition. Sipa"pin is a natsu but also a pohopin. Tootsa is a natsu and a pahon and a tea. As pointed out previously, this is not simply a case of overlapping taxonomy but a clear violation of the transitive logic required of taxonomic relationships. The conclusion of this study must be that

although the ability to construct taxonomic trees may be a universal human trait, it does not represent a universal conceptual format. It is not difficult for reasonably intelligent humans to construct taxonomies by using a "this is a kind of this" logic. Although reluctant to do so, the informants in this study were able to employ the same process to construct taxonomies. The informants made it explicitly clear, however, that they thought the task irrelevant. Some even refused to perform it. It would seem very unlikely that a task deemed so difficult and irrelevant would reflect a fundamental means of conceptualization. Researchers who have reported concise, transitive, mutually exclusive folk taxonomies based on a single classificatory criterion must answer for themselves if those taxonomies represent universal modes of conceptualization or artifacts of their methodology.

While this study does seem to indicate that memory is not simply a data bank containing a comprehensive taxonomy of past perceptions, it does not clearly indicate what the nature of the storage system may be. Randall's (1976) suggestion that memory is made up of prototypic images seems to fit the data better than the taxonomic theory. Following his line of reasoning, Shoshonis would have a number of images in their minds which represent categories in the plant domain. These images presumably were formed following the principles of social psychological theory, that is, as the result of interaction with the environment and other people. A name such as <u>pohopin</u> would correspond to a mental image. A novel item in

the environment would be compared to this mental image. If it came closer to the image of pohopin than the image for sohopin, it would be grouped with the former. Where more than one image is appropriate, the image is selected on the basis of social imperatives. For example, if a Shoshoni is in need of a cold medicine, sagebrush will be categorized as natsu (medicine) rather than pohopin. This would make it possible to produce taxonomies even though the information is not stored in that form. By comparing sipa"pin with the mental image of pohopin, the decision can be made to call sipa"pin a kind of pohopin. thus describing a taxonomic relationship.

It is not necessary to discard the notion of conceptualized taxonomies altogether. Contrast sets and very shallow taxonomies probably are used for memory storage. The image of sonippeh (grass) may be contrasted with puisonippeh (alfalfa). The three kinds of pokompih, that is, ainka, oha and tuu, may form a small taxonomy in the memory. These examples of contrast sets and taxonomic relationships are far less extensive, however, than those reported in the literature.

Another assumption that must be questioned is the need for grouping of items above the generic level. Generic terms are, of course, names for groups of items. "Sunflower" does not name a single, discrete plant but all plants that are sunflowers. But is it necessary to group all sunflowers consistently within some superordinate category? Informants in this study were reluctant to group generics and call them all by a single name. The informants

invariably preferred generic names to more general terms. This was particularly the case with culturally important plants. For example, one informant who was shown the Shoshoni ornithological tree published by Miller (1976, p. 483) remarked that it was all right to group many different kinds of birds into groups called kwinaa or huitsuu because it was not necessary to know the individual kinds of birds. But when plants were harvested, they were referred to by name and gathered separately. The latter statement provides a clue to the particular world view of the Shoshonis and probably of other hunter/gatherers as well. Wild crops do not occur simultaneously in the environment. They occur in series beginning early in spring to late in the fall. As the harvest of certain seeds nears completion, another kind of seed or root or fruit ripens and gathering efforts are concentrated on the new crop. Unlike modern Americans who often see groups of fruits or vegetables of various kinds all together at one time, the Shoshonis seldom saw plants grouped in this way. To group plants together conceptually which are always separated by time and space in the environment is an abstraction which is not always relevant or necessary.

The great amount of variation in responses among the informants may be a reflection of the extremely individualistic character of the Shoshoni people. This individualism is, in turn, a reflection of the simple and atomized social structure that life in the parsimonious environment of the Great Basin necessitated.

SUMMARY AND CONCLUSIONS

The Shoshoni-speaking people interviewed in the course of this study employed four criteria for the classification of plants. The criteria are morphology, cultural utilization, geographic setting and growth habit. The use of multiple criteria for classification and the difficulty in eliciting taxonomic trees from the informants seem to indicate that conceptualization of the plant domain for Shoshonis is not in the form of extensive taxonomic relationships. Randall's (1976) hypothesis that conceptualization may take the form of prototypic images seems to be supported by the data in this study.

The taxonomic trees which were produced by the informants were similar in structure to those reported in the literature. They were, however, based on multiple criteria and were shallower. They also contained some polysemous terms in cases where a higher-order taxon derived its name from a lower-order taxon.

Little support for the Whorf hypothesis was found in this study. On the contrary, the criteria of growth habit which was encoded in the language was little used by the informants in this study. To be congruent with the Whorf hypothesis, informants should have classified plants along the lines dictated by the language structure. This inconsistency may be partially explained, however, as the result of culture contact with whites. Old methods of

classifications encoded in the language may be yielding to the classificatory schemes of English folk botany.

Further research with Shoshoni speakers on other domains would be important to substantiate the findings of this study. Miller's (1976) research on Shoshoni ethnoornithological classifications was more consistent with the results obtained from other groups. This may reflect the lower cultural significance of birds as opposed to the plant domain which interacts with several cultural categories. It is possible, too, that some of the anomalies in this study were the result of the unique cultural heritage of the Shoshonis. Historically, the Shoshonis were a hunting and gathering people. Ethnoscientific studies of the other two major groups of hunter-gatherers, namely the Bushmen of Africa and the Aborigines of Australia, have not been performed.

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APPENDIXES

Appendix A

Compendium of Plants Used by the Great Basin Shoshoni

Acer spp. (Maple). [Kusihuppin or kettehuppin]* Used for firewood, bows, digging sticks.

Allenrofea occidentalis (Pickleweed). [Hukkan] Regarded as inedible by some Shoshonis but very desirable by others for its seeds which were ground for gruel.

Allium spp. (Wild onion). [Kenka, moontsih, newe kenka] Collected for greens or bulbs which were added to stews. The dried seed clusters were used for flavoring during the winter. Domestic onions were sometimes referred to as taipo kenka or white man's onion.

Amaranthus spp. (Pigweed). [Atsix or eapih] Seeds were collected and ground for gruel.

Amelanchier alnifolia (Service berry). [Teampih] The fruits were gathered and used fresh or dried.

Artemisia spp. (Sage). [Poho or pohopin] Sage is considered a medicine or natsu. The leaves are boiled to make a tea which is said to be good for colds and flu by relieving headache and cough. When available, rabbit brush and juniper leaves are added to the tea. The leaves may also be chewed or crushed and placed in a cloth to be put on the chest for relief of colds. A small, sticky projection that sometimes forms on

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*Shoshoni name

stems is used as chewing gum or sanakoo. The seeds of sagebrush were also collected and ground. The Shoshoni distinguished among several kinds of sage, including: pohopin (big or black sage), pakwiyumpih (little or immature sage), kumpippeh (button sage), aisen pohopin (grey sage).

Balsamorrhiza sagittata (Arrowleaf balsamroot). [Akken or kusi akken] Although usually mentioned as a source of sunflower-like seeds, the large edible roots were undoubtedly gathered also.

Betula (Birch). [Hukutsappeh or kusihuupin] Where locally available, birch poles were important in the construction of winter tipis. The poles were placed close together and then thatched with juniper or pine boughs layered butt-end upward to shed water. Leaves gathered from beneath mahogany trees were poured on the thatched tipi and tapped with a stick to fill in small holes and complete the thatch. Also used in basket making because of flexibility, and sticks for knocking down pine cones.

Calochortus nuttallii (Sego lily). [Sikoo] The sego provides a nutritious bulb which was often eaten raw.

Camassia spp. (Camas lily). [Pasikoo] Provides an edible root which must be distingushed from the roots of Zigadenus or death camas. Called tapaisikoo by the Shoshonis, Zigadenus is extremely poisonous.

Castilleja (Indian paintbrush). [Tokoahepinkeppeh] Means literally "snakeflower;" also sometimes called tokoampisippeh. Some

Shoshoni considered this plant a warning that a rattlesnake is close by. Flowers of Castilleja were brewed in a tea and used as a laxative.

Ceanothus velutinus (Mountain balm). [Tasippeh or tattippeh] The white berries of the Ceanothus were used as eye medicine or natsu. The juice of the berry was squeezed directly into the eye for relief of irritations.

Cercocarpus ledifolius (Mountain mahogany). [Tonampih] The pink tissue scraped from under the bark made a flavorful tea which was reputed to be good for the blood. The hard mahogany wood was used for digging sticks and other tools and for firewood. The leaves were added to the thatch for tipis to supply extra insulation.

Chenopodium spp. (Goosefoot). [Kokax] This plant is a source of edible seeds.

Chrysothamnus spp. (Rabbit brush). [Sipa"pin or tapaisipa"pin] Uses similar to the sages, as a cold medicine, or a source of chewing gum. The tea was also used as a rinse for the hair. The yellow blossoms in the fall indicate that the pine nuts are ready to be harvested.

Clematis spp. (Clematis). [Isa wana, wana] Clematis vines were used primarily as rope. The word isa refers to isapaippeh the coyote of Shoshoni mythology who in one story became entangled in Clematis vines.

Cirsium spp. (Thistle). [Poko or tsenkampoko] The stems were peeled and the pith was eaten raw.

Datura (Jimson weed). [Muippeh] It is believed by some Shoshonis that the chewing of Datura leaves will produce dreams which will predict events a year in the future. It is also referred to as hand game medicine. The hand game is similar to the shell game where the opponent hides a bone or other object in his hand. Chewing a small wad of Datura enables the player to accurately guess the hand that contains the object. Datura is known to be a very powerful and dangerous medicine. Some Shoshonis feel its use may in some way adversely affect the user's children.

Elymus (Wild rye). [Pia sonippeh] A source of edible seeds and forage for animals.

Ferula multifida (Indian balsam) [Tootsa, tootsappeh] The Ferula roots were shaved with a knife and the shavings were mixed with Indian tobacco and smoked for relief of colds. Alternatively the roots were boiled and the liquid was drunk.

Helianthus (Sunflower). [Akken, hiyompeh, toyakken] An important source of seed which was gathered together indiscriminately with seeds from other sunflower-like plants such as Balsamorrhiza. The baked or raw seed was crushed with mano and matate and winnowed in a basket. The cleaned seed was then ground to flour and made into a pudding or gravy. The juice of the mountain sunflowers was used for a pinkeye remedy.

Iva axillaris (Poverty weed). [Patussippeh] Source of edible seeds.

Juniperus spp. (Cedar or juniper). [Waapin or sawaapin] Twigs of juniper were burned to refresh the tipi and drive away the ghosts of Indians who had recently died. When available, it was added to sage and rabbit brush to make a tea for relief of colds and flu. It was also used as thatching material for tipis.

Mammillaria and Opuntia (Cactus). [Wokaipin, aikopin, metsa, kenka, tasempeh] Pieces of cactus were covered with coals and roasted. A sharpened stick was used to determine when the cactus was done. When tender, the cactus was cut in half with a knife and the inside scooped out and eaten. Indians compare the taste with that of pumpkin. The fruits of cactus called oopin were eaten raw or dried for winter use. Wokaipin is a term which sometimes refers to the peyote cactus Lophophora williamsii which is not familiar to Indians in northern areas.

Medicago sativa (Alfalfa). [Punkutekka or puisonippeh] Punkutekka means literally "horse food" and describes its major use.

Melilotus alba and M. officinalis (Sweet clover). [Piapunkutekka] Literally "big horse food" or alfalfa. Used for animal fodder.

Mentha canadensis and M. arvenis (Mint). [Pakwana] The mints were widely used as tea. Some thought mint tea was good for the nerves.

Mimulus guttatus (Monkey flower). [Antapittseh kwana] Means literally foreign or enemy smell. Described variously as smelling like another Indian tribe, a Sioux or like copper. Used as an internal medicine.

Nasturtium officinale (Watercress). [Pamun] Sometimes collected for greens.

Nicotiana attenuata (Green tobacco). [Puipahon] Puipahon was smoked by the Indians like N. tabaccum. Some Shoshoni would burn over areas of land to encourage its growth.

Nicotiana tabaccum (Tobacco). [Pahun, pahon] Introduced by the white man and smoked by the Shoshoni.

Oregenia (Indian potato). [Soko tsinaa] Oregenia produces roots which, when baked or roasted, are similar in flavor to cultivated potatoes.

Pinus spp. (Pine tree). [Sanawaappin or waapin] Pine trees were a source of wood for fires, pine boughs for thatching and twigs to burn to keep away the ghosts of people who had recently died. Pitch from the trees was used as a medicine in a variety of ways. It was rubbed on wounds and areas of the body afflicted with rheumatism to relieve pain. It was placed on a tooth for toothache. Three or four hardened drops of the sap were swallowed as a treatment for venereal disease.

Pinus edulis, P. monophylla (Pinyon pine). [Tepawaappin] Pine nuts from pinyon pines provided the most important staple food for most Shoshonis. When the rabbit brush bloomed and the rose

hips became red, indicating that the pine nuts were ripe, Shoshoni families gathered in the mountains for the harvest. The harvest was as thorough as possible; cones that did not open naturally to yield the pine nuts were placed on large flat rocks and beaten with sticks to thresh out the seeds. Large caches of the nuts were stored in pits in tipis for winter use. A favorite food of the Shoshonis was pine nut gravy. The pine nuts were roasted and then crushed with mano and matate. The crushed pine nuts were placed in a basket and winnowed to remove the shells and then returned to the matate and ground into flour. The flour was made into a soup or gravy of desired consistency by the addition of boiling water.

Populous fremontii (Cottonwood tree). [Sohopin] The term "sohopin" was used to refer to all trees in general by some Shoshonis or to all deciduous trees by others. Apparently it was used mainly as a source of wood.

Populous tremuloides (Aspen). [Senkapin, senapin] One Shoshoni used the term senkapin to denote any deciduous tree cultivated by the whites. Probably used only for firewood.

Prunus virginiana (Chokecherries). [Toonampeh, toonkwisappeh, toonkuitsappeh] Source of berries which were eaten fresh or dried.

Purshia tridentata (Butterbrush or deerbrush). [Henapin] Source of hardwood for tools such as digging sticks.

Quercus undulata (Scrub oak). [Kunniappeh] Source of hardwood and acorns, although none of the Shoshonis in this study mentioned the use of acorns as food.

Rhus trilobata (Sumac). [Ittseppeh] Sumac berries were used for food and the branches were gathered for basket making.

Ribes spp. (Currant). [Pokompih] The currants were gathered and eaten fresh or dried for winter use. There are tu, ainka or ohapokompih referring to black, red or yellow currants, respectively. Sometimes the term pokompih was used to denote all berries or fruits in general.

Rosa spp. (Wild rose). [Tsiapin, tsiahepinkeppeh] Rose hips were strung and worn as a necklace by some. The stems were scorched to remove the thorns and used as rims for cradles and baskets. When the rose hips turned red in the fall, it was a sign to Shoshonis that pine nuts were ready to harvest.

Rumex spp. (Dock). [Newe nokko, newe natsu] The roots of Rumex were boiled and used as a medicine.

Salix spp. (Willow). [Sehepin, seepin] Willows were an important source of materials for baskets, cradle boards and other items. Willow shoots about a half meter tall were cut and scraped clean of bark with a knife. Larger willows were split into long, thin strips which were used to lace the scraped shoots into the shape of baskets or other implements.

Sambucus racemosa (Elderberry). [Teyampe, kuniki] The berries were eaten fresh or dried for winter.

Scirpus lacustris (Rush). [Saippeh or pasaippeh] Roots of Scirpus were gathered, peeled and eaten raw. The rushes were braided into mats.

Sisymbrium canescens (Wild mustard) [Poinappeh or poina] A source of edible seeds which some Shoshonis found desirable while others avoided it.

Troximon arantiacum (Indian lettuce). [Muittsuhkippeh] Source of edible greens.

Typha latifolia (Cattail). [Toih, toihppeh] The Typha roots were peeled and eaten raw and the leaves were woven into mats and other items.

Wyethia amplexicaulis (Mule ears). [Piakken, akken] Wyethia produces seeds in sunflower-like heads which were gathered, crushed, winnowed in baskets and ground into flour.

Appendix B

Shoshoni Plant-Related Terms

hepinkeppeh	flower, flowering parts
huupin	stick, wood, log
kettehupin	hardwood
natsu	medicine, sacred, poison
po'ah	bark
poho	brush
puippeh	grass (generic), low-growing green plants, weeds
puisonippeh	hay
puitekkappeh	green food
sanapehe	juniper berry
sanappin	pitch
seki	leaf
sohopin	cottonwood, trees (generic), deciduous trees
tekkappeh	food
tepa"	pine nut
tepakoppeh	pine cone
tepatsippeh	pine nut shell
tetena	root
waapin, puiwaapin	any tree (generic), any conifer, cedar (juniper)

Appendix B (Continued)

wahukopih	pine needle
wasanapin	pitch
wate	stem

Appendix C

Shoshoni Plant Names Used in This Study

aa"-pin, aappai	kind of plant with edible root that grows in the north
akken	sunflower, sunflower seed (*Helianthus*)
appo huu"pin	apple tree (*Malus pumila*) derived from English
atsix	*Amaranthus*
antapittseh kwana	yellow monkey flower (*Mimulus guttatus*)
ea-pih	pigweed (*Amaranthus*)
hena-pin	deerbrush (*Purshia tridentata*)
hukkan	pickleweed (*Allenrofea occidentalis*)
hukutsa-ppeh	birch tree (*Betula*)
huni-pih	kind of wild root plant which tastes like a parsnip. Possibly salsify. (*Tragopogon dubius* or *porofolius*)
isa wana	*Clematis*
ittse-ppeh	sumac or squawberry (*Rhus trilobata*)
kankem-pin	shadscale (*Grayia polygaloides*)
kenka	wild onion (*Allium*)
kettehupin	hardwood, maple, greasewood
kokax	goosefoot (*Chenopodium homile*)
kuneai-ppeh	dogwood (*Cornus stolenifera*). Also referred to as *ainka-kuneaippeh*.
kunnia-ppeh	scrub oak (*Quercus undulata*)

kunuki	elderberry (Sambucus racemosa)
kuppihsi-ppeh	sweet cicely (Osmorhiza occidentalis)
kusi akken	Arrowleaved Balsomroot (Balsomorrhiza sagitata)
metsa	cactus (Mammilaria) similar but not the same as 'tasem-peh'
moontsih	onion (Allium)
mui-ppeh	jimson weed (Datura)
muittsukki-ppeh	(Troximon aurantiacum)
newe nokko	possibly curlydock (Rumex crippus)
pahun, pahon, pahmon	tobacco (Nicotiana tobaccum)
paitesi	wild garlic
pakwana	mint (Mentha canadensis and arvensis)
pamun	watercress (Nasturtium)
pasoki-ppeh	kind of plant which is ground up for use as a linimint
pasikoo	camas (Camassia)
patussi-ppeh	poverty weed (Iva axillaris)
piakken	mule ears (Wyethia amplexicaulis)
pia soni-ppeh	wild rye (Elymus)
poho, poho-pin	sage (Artemisia)
poina	wild mustard seed (Sisymbrium canesans)
poko	thistle (Cnicus eatoni)
pokom-pih	currant (Ribes) pokonoppeh current bush
puippahon	green tobacco (Nicotiana)

pui", pui-ppeh	grass
punkutekka	alfalfa (Medicago sativa)
sai-ppeh	rush (Scirpus lacustris)
saka-pin	black walnut tree (Juglans nigra)
sama-pin	cedar or juniper
sanakkoo	maybe milkweed
sanawaapin	pine tree (Pinus)
sehe-pin, see-pin	willow (Salix)
senka-pin, senna-pin	aspen (Populus tremuloides)
sihmu	(Atriplex confertifolia)
sikoo	Sego lily (Calochortus nuttallii)
sipaix	sweet william (Phlox longifolia)
sipa"-pin	rabbit brush (Chrysothamnus)
soho-pin	cottonwood tree (Populus)
soko tsinaa	Indian potato
tapaisikoo	death camus (Zigadenus)
team-pih	serviceberry (Amelanchier alnifolia)
tepa waapin	pine nut tree (Pinus edulis, monophylla)
tatti-ppeh, tasi-ppeh	mountain balm (Ceanothus velutinus)
toih-ppeh	cattail (Typha latifolius)
tokoahepinkeppeh, tokoaampisippeh	Indian paintbrush (Castilleja)
toonampeh	chokecherries (Prunus virginiana)
tootsa	Indian balsam

toyakken	mountain sunflower
tsenkampoko	hillside thistle (Cnicus undulatun and drummondi)
tsohwanpex	stickseed (Hackelia floribund)
tsowaika	kind of plant with edible root which grows to the north (Owyhee, Oregon)
tsia-pin	wild rose bush (Rosa)
tukuntsia	wild raspberry (Rubus leucodermis)
wata, watatekka	grass (Suada depressa and Artemisia biennis)
watontsi-ppeh	wild rye (Elymus)
witsaa nampai	false yarrow (Chaenactis douglasii)
wiyeen	buffalo berry (Lepargyrea)
waikai sikkix	prickly poppy
wokai-pin, aiko-pin	cactus, peyote
wonko-pin	spruce
yampa	wild carrot, camus roots

Appendix D

Taxonomy Ia

puippeh
- puippeh
- kenka
- pia sonippeh
- hiyompeh
- pakwana

unnamed
- henapin
- saippeh
- poina
- pokompih
- huupih
- kukkan
- teampih
- pohopin
- kunuki
- sipapin

pokompih
- tuu pokompih
- oha pokompih
- ainka pokompih

soko-kuppantan tepi
- soko tsinaa
- pasikoo
- sikoo
- tapaisikoo
- takoahepinkeppeh

sohopin
- appo huupin
- toonampih
- ainka kuneaippeh
- seepin
- kettehupin
- waapin
- sanawaapin
- tepawaapin

Appendix D

Taxonomy Ib

	sohopin	sohopin	
		henapin	
		sipapin	
		ainka kuneaippeh	
		senkapin	
		kettehupin	
	tapoon sohppeh	tepawaapin	
	natsu	sanawaapin	
		waapin	
tsaan		tokoahepinkeppeh	
		pohopin	
	tekkappehnee	toonampih	
		appohuupin	
		pakwana	
		hiyompeh	
		kenka	
	pokompih	hunuki	
		teampih	tuu pokompih
		pokompih	oha pokompih
		huupih	ainka pokompih
	tan-kahni-nai-nee	seepin	
		pia sonippeh	
		puippeh	
	soko tsinaa	soko tsinaa	
		sikoo	
		pasikoo	
kaitsaan		tapai sikoo	
		poina	

Appendix D

Taxonomy II

sohopin	tewa waapin	
	waapin	
	sohopin	taipo sohopin
	kunniappeh	sohopin
	ittseppeh	
	teampih	
	sehepin	
	teyampin	
puippeh	pahmun	
	sonnippeh	pia
	eapih	sonnippeh
	puippeh	
puitekappeh	pakwana	
	pamun	
	muittsuhkippeh = puitekappeh saippeh	
newe nokko sokotekappeh	kenka	taipo kenka
	yampa	
	sikoo	
	wakaipin	
	pohopin	
	sipapin	
pokompih	puipokompih-gooseberries	
	newe pokompih-chokecherries	
(unnamed)	hiyompeh	
	tokoahepinkeppeh	

Appendix D

Taxonomy III

Intermediate	Life Form	Generic	Specific
	soko teta	kenka	
		sikoo	
		yampa	
		sokotsiina	
	tepa	tepa waapin	
	pehe	hukkan	
		atsix	
		akken	
		poina	
		hiyompeh	
tekappeh		piakken	
	puitekappeh	wokaipin	
		pamun	
		poko	
		kenka	
	pokompih	pokompih	ainka pokompih
		teampih	oha pokompih
		teyampe	tuu pokompih
	sanakoo	sanakoo	
		sipa"pin	
		pohopin	
	hepin	pakwana	
	natsu	tasippeh	
		newe nokko	
		pohopin	
		sipa"pin	
	sonippeh	sonippeh	
		pia sonippeh	
		puippeh	
		puisonippeh	
		pahon	
	sohopin	sohopin	
		sehepin	
		sanawaapin	
		waapin	
		kuniappeh	
		kettehupin	

Appendix D

Taxonomy IV

sehepin	sehepin wana sanakkoo
(unnamed)	punkutekka pakwana pamun
pohopin	pohopin saippeh kankempin sipai huupin sipa"-pin
sonippeh	waih puippeh
food, berries	tsiapin tonampeh wiyempeh ittseppeh pokompih kunuki
(unnamed)	sikoo tokoahepinkeppeh
foods	kenka eapih yampa akken — toyakken, kusiakken, piakken
pahon	tootsa puipahon
waapin	tewawaapin -- also food sanawaapin samaapin wonko-pin -- all big evergreens toyawaapin
sohopin	sohopin senkapin
kettehupin	henapin
natsu	muippeh wokaipin

Appendix D

Taxonomy V

tekappeh	pakwana yampa moontsih toonampeh wiyempih
tekappeh (mountain)	waapin teyampe tepawaapin sanawaapin
pahon	puipahon pahon tootsippeh
make things out of (unnamed)	wana seepin tsiapin hukutsappeh
(unnamed)	muippeh wokaipin
animal food	pia sonippeh puippeh punkutekka
natsu	pohopin sipa"-pin pamahopin
(unnamed)	saippeh hatti
(unnamed)	poko

Appendix D

Taxonomy VI

sonippeh	piasonippeh
	waih
	watontsippeh
	puisonippeh = punkutekka
	puippeh
	muippeh
pohopin	toih
	pakwana
	poina
	wata
	tsiapin
	pohopin
	sipa"-pin
pahun	tootsa
	poho
	nokko
	puipahon
	wokaipin
hepinkeppeh	tokoahepinkeppeh
pokompih	pokompih
	teyampe
	(mahogany)
	akken
	wiyempih
	toonampeh
	paitesi
	moontsih
	yampa

VITA

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