THE PERSONAL LIVING SPACE CUE INVENTORY
An Analysis and Evaluation

SAMUEL D. GOSLING *is an assistant professor of psychology at the University of Texas at Austin. His research focuses on how individuals leave deliberate and inadvertent clues about themselves in their personal environments. He also does research on personality in nonhuman animals.*

KENNETH H. CRAIK *is professor of the Graduate School in the Department of Psychology at the University of California, Berkeley. He was founding coeditor of the* Journal of Environmental Psychology *and is past president of the Division of Environmental Psychology of the International Association of Applied Psychology. His research interests include personality theory and assessment, environmental assessment, and the psychology of humor.*

NICHOLAS R. MARTIN *is a personnel research psychologist for the Office of Personnel Management and a Ph.D. candidate in the Industrial/Organizational Psychology Department at The George Washington University. His interests lie in the area of personality, performance, and job satisfaction.*

MICHELLE R. PRYOR *is a founding partner and co-owner of Sprokkit, an Internet-based company that provides specialized marketing and technology solutions to a range of industries. She received a BA in Psychology from the University of California, Berkeley. Her interests include using insights from psychological and environmental research to create more effective Web technologies.*

ABSTRACT: The authors introduce the Personal Living Space Cue Inventory (PLSCI), designed to document comprehensively features of personal living spaces (PLSs); common examples of PLSs include rooms in family households, dormitories, or residential centers. The article describes the PLSCI's development and provides evidence for its reliability and sensitivity. Next, the authors employ case-study comparisons to illustrate and evaluate the perspectives provided by global descriptors and specific-content codings. It is concluded that global ratings and specific codings provide complementary yet distinct characterizations of PLSs.

ENVIRONMENT AND BEHAVIOR, Vol. 37 No. 5, September 2005 683-705
DOI: 10.1177/0013916504274011

Keywords: *residue theory; environmental assessment; residential environments; psychology*

Personal living space (PLS) is a concept intended to designate a class of residential environments that holds increasing importance within contemporary urban life (S. D. Gosling, Craik, Martin, & Pryor, in press). Much more than a bedroom but less than a full-fledged house, a PLS is typically a room nestling within a larger residential setting while affording primary territory for a designated individual. PLSs are pertinent to several developmental stages of modern lives. PLSs can include an adolescent's room within the family household, a room within a college dormitory suite, a room within an apartment shared by young adult peers, a room within a boarding house that serves meals, a bed-sit within a single-occupancy hotel, and a room within a residential center for the elderly. Within Altman's (1975) broad and useful taxonomy of types of territory (i.e., primary, secondary, and public), PLSs can be considered as one kind of primary territory. Thus, PLSs would be subsumed along with such other settings as homes, individual offices in commercial buildings, and private rooms in treatment facilities.

The aim of this research is to introduce and evaluate a new instrument, the Personal Living Space Cue Inventory (PLSCI), designed to document comprehensively the features of PLSs. We describe the development of the PLSCI and provide an evaluation of it in terms of its reliability and sensitivity. Using case studies, we compare the merits of environmental assessments that rely on broad global descriptors with those that code specific-content elements of a space.

AUTHORS' NOTE: *Preparation of this article was supported by a Humanities Research Grant from the University of California, Berkeley, National Institute of Mental Health Grant MH64527-01A1, and by a fellowship from the Center for Advanced Study in the Behavioral Sciences. We are grateful to Lauren Altman, Allison Bonburg, Keren Brooks, Alice Chuang, Linda Huang, Lane Johnson, Adam Klinger, Peter Lwin, Susan Orgera, Jenny Vuong, Alex Wang, and Mei-Ling Woo for their help in collecting the data reported here. We thank Jennifer Beck, Oliver John, and Delroy Paulhus for their advice on the research design and their helpful comments on earlier drafts of this article. We are also grateful to Susanna Douglas for her assistance in preparing the figures and to Anthony Maxwell of the Federal Bureau of Investigation for his consultation on scene-of-the-crime techniques and advice in the design of the PLS-assessment procedures.* *Correspondence should be addressed to Samuel D. Gosling, Department of Psychology, University of Texas at Austin, Austin, Texas 7871; e-mail: samg@mail.utexas.edu.*

CRITERIA FOR A COMPREHENSIVE ENVIRONMENTAL ASSESSMENT INSTRUMENT

What are the qualities we expect of an instrument for assessing PLSs? Ideally an instrument that measures features of the environment will satisfy several criteria (Craik, 1971).

First, the instrument should be usable across the range of spaces typically found in the type of PLS under examination. It should be able to assess and document small multipurpose dorm rooms and large single-purpose bedrooms. In addition, it should offer a flexible model for constructing similar techniques for related kinds of primary territories.

Second, a PLS assessment inventory should be comprehensive and detailed in terms of the features it includes. If the most psychologically significant features are to be found in the details of a PLS, then the inventory should record its minor as well as major features. Thus, in addition to recording the presence of a bed, chairs, and a desk, the inventory should also include specific-content items such as a person's clock (and whether it was on time, slow, or fast) and whether the occupant had a wastebasket and how full it was. In short, the assessment instrument should meet Tognoli's (1987) call for an exhaustive itemization of the contents of a PLS.

Third, the inventory should capture global as well as specific features of the space. Thus, in addition to itemized content, the inventory should assess broader, configural aspects of the space, such as whether the space is untidy or colorful.

Fourth, the inventory should be comprehensive in terms of sensory modalities. Elements of smell, sound, and lighting level are key components of a comprehensive inventory (Kasmar, 1970). Is the PLS stuffy or drafty? Are there noises present and where are they coming from?

Fifth, the PLS inventory should meet the psychometric criteria for standard environmental assessment instruments (Craik & Feimer, 1987), such as generalizability and sensitivity. The first criterion is whether the assessment of places is dependable or reliable; that is, the extent to which we can count on the assessments to generalize across observers and occasions. The second criterion to consider is the extent to which the assessments display sensitivity of measurement; that is, differentiation among the places assessed.

Sixth, it should be possible to use the instrument to assess PLSs at a reasonable rate and with manageable logistics. Based on the constraints of our own research, we selected 30 minutes as a reasonable amount of time in which to assess a single living space.

Previous research. Previous attempts to assess interior environments include Kasmar's (1970) Environment Description Scale (EDS), and Laumann and House's (1970) Living Room Checklist (LRC).

Kasmar's (1970) EDS is the most comprehensive instrument to date to document the features of interior spaces. In line with her goal to "develop a lexicon of architectural descriptors that are relevant and meaningful" (Kasmar, 1970, p. 155), she created a set of rating scales for architectural descriptors that nonarchitects could use to describe physical environments.

The EDS was created using a multistage procedure, culminating in an evaluation phase in which the instrument was tested on three rooms. The final product was an instrument of 66 adjective pairs (e.g., appealing vs. unappealing, expensive vs. cheap) that could effectively be used to record the broad, global elements of architectural spaces. The EDS met the first, third, fourth, fifth, and sixth criteria for a good instrument outlined above; that is, the instrument could be applied to a wide variety of spaces, it assessed configural aspects of the space, it included multiple sensory modalities, it generated reliability and sensitivity measures, and it could be used to assess rooms efficiently. However, the instrument did not meet the second criterion—recording the specific elements to be found in a space and providing a detailed itemization of content. Furthermore, the EDS was intended for very broad application, to assess "architectural space in general" (Kasmar, 1970, p. 156). For example, the specific test environments included a library reading room, a dining room of a student union, a large lecture hall, an airline terminal, a church interior, an executive office, a kitchen, and a bathroom.

Moving more toward the home environment and the itemization of specific contents, Lauman and House's (1970) 53-item LRC did include some specific-content items such as "large potted plants," "French furniture," and "sunburst clock." The instrument was designed for use by an interviewer during a 10-minute break of an interview conducted in the interviewee's home. Thus, the goal of the instrument was to be brief and to focus on a few key elements, rather than to obtain a comprehensive assessment of the physical space. Consequently, the list of terms included in the LRC was far from a comprehensive and detailed itemization of even living room contents. Thus, the LRC was in the spirit of our approach but did not meet the criteria listed above for a thorough assessment of PLSs.

Exploring the meaning of things found within the home, Csikszentmihalyi and Rochberg-Halton (1981) studied the household objects nominated as "special" by members of 82 extended families. The method did not aim at a comprehensive itemization of home contents but rather the subset of special objects. They devised a 41-category system to encompass the nominated objects (e.g., beds, photographs, clocks, carpets, candlesticks).

In a study of personalization within university dormitory rooms, Vinsel, Brown, Altman, and Foss (1980) made an important step toward PLS assessment. Their method entailed taking photographs of the walls over beds of 53 male and 32 female students. Content analysis of the photographs employed eight categories having to do with entertainment equipment, personal relationships, values, abstract, reference items, music-theatre, sports, commitment to the university, commitment to home and high school, and idiosyncratic. The total area decorated and the diversity of decorations were also measured. Thus, the approach dealt with one important but quite limited realm (i.e., wall decorations).

A central goal of the current research was to build on these efforts and to create an expanded environmental assessment instrument that meets all six of the criteria listed above, allowing researchers to document the physical features of PLSs comprehensively and effectively.

METHOD

We created the PLSCI to enable researchers to compile comprehensive inventories of environmental characteristics found in PLSs. This instrument was created as part of a broad research program examining the connections between individuals and the environments in which they live.

PHASE 1: SELECTION OF CUES FROM PREVIOUS RESEARCH

The goal of Phase 1 was to incorporate a broad range of descriptors that had been identified in previous research. Four judges independently reviewed and categorized each of Kasmar's (1970) 66 EDS adjective pairs in terms of whether the adjective pairs were useful for describing PLSs. The judges were graduate or advanced undergraduate students well versed in the relevant literature. After making their independent categorizations, all four judges met to discuss their categorizations. Adjective pairs were retained or rejected using the following procedure. If there was unanimous agreement regarding the applicability of the adjective pair, it was rejected or retained accordingly. If three of the four judges agreed, the majority view held unless the minority judge could present strong arguments in favor of his or her opinion. In the case of a split vote, the judges discussed the adjective pair in question until they reached a consensual decision about either rejecting or retaining it.

Using this procedure, 16 of the 66 adjective pairs were unanimously rejected, 9 were unanimously retained, 17 were rejected by majority, 13 were retained by majority, and there was a split vote for 11 adjective pairs, of which 6 were eventually retained. Three of the judges consensually reviewed the resulting list of 28 adjective pairs for redundancy. They eliminated descriptors considered redundant in the context of PLSs (e.g., uncrowded-crowded was considered redundant with uncluttered-cluttered and was rejected). This second procedure resulted in a total of 21 adjective pairs.

PHASE 2: GENERATION OF NEW CUES

In return for course credit, 396 undergraduates (60% of them women) at the University of California, Berkeley, participated in one of two studies. In both studies, participants were asked to nominate cues from a person's living space that they thought would in some way be indicative of the occupant's personality. Each participant was asked to nominate 10 cues using one of two forms, corresponding to two nomination procedures.

Nomination procedure 1. One hundred ninety-five participants completed a relatively structured cue nomination form. Because individuals with different personalities tend to have different cues in their PLSs (S. D. Gosling, Craik, et al., 2005), we wanted to ensure that cues for each of the major personality dimensions were included within the initial set of cues. We therefore collected cues relevant to each of the dimensions of the five-factor model (FFM; John & Srivastava, 1999; McCrae & Costa, 1999). The FFM is a hierarchical model with five broad factors, which represent personality at the broadest level of abstraction. Each bipolar factor (e.g., extraversion vs. introversion) summarizes several more specific facets (e.g., sociability), which, in turn, subsume a large number of even more specific traits (e.g., talkative, outgoing). Participants were given a short description of each of the FFM dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness to new experiences). Then, they were asked to nominate two cues indicative of each dimension, one cue for the low pole and one cue for the high pole. For example, one participant nominated "cluttered room" for low conscientiousness and "organized desk" for high conscientiousness. This procedure produced 2,440 individual nominations.

Nomination procedure 2. Two hundred one participants completed a less structured cue nomination form, which was designed to ensure that the FFM framework did not restrict the range of cues generated. In contrast to the first procedure, which started with a trait to prompt a relevant cue, the second

procedure started with a cue and then elicited nominations for associated traits. Specifically, participants were asked to list cues found in the PLSs of individuals they knew and then to indicate the trait they thought each cue betrayed (e.g., stuffed animals for the trait dependent). This procedure produced 1,980 individual nominations.

Together, both forms produced a total of 4,420 individual cue nominations. The combination of these two forms ensured that (a) the full range of the FFM was adequately represented in the final pool of cues and (b) the range of cues nominated was not restricted by the FFM framework.

PHASE 3: REVIEW AND FINAL SELECTION OF CUES

The goal of Phase 3 was to reduce the pool of cues to a manageable set for use in the PLSCI. A panel of 12 judges reviewed the list of 4,420 cues generated in Phase 2 to categorize them into sensible groups, eliminate errors, and reduce redundancy. The judges sorted the cues into 24 categories, which inevitably varied somewhat in their level of abstraction (art, athletic equipment, books or magazines, organizing principles, clothes, attributes of clothing, odors, patterns, objects, placement of items, state of room, affective rating, colors, decor, lighting, pets, music, noises, temperature, cues from non-PLS spaces, furniture, attributes of furniture, beauty products, and possessions). The panel rejected nominations that were not physical cues or were not typically found in PLSs. For example, actions (e.g., talks on the phone a lot), and cues found outside PLSs (e.g., dental floss in automobile glove compartment) were excluded. Multiple participants nominated many of the same cues, and the judges eliminated such redundancy. This procedure produced a total of 725 unique PLS cues. In keeping with the instrument's goals, the cues ranged from very specific items (e.g., Dungeons and Dragons game) to very general descriptors (e.g., cheerful). The list included a combination of descriptive adjectives (e.g., organized, smelly, black, half-eaten, crumpled, broken, floral) and objects (e.g., granola bars, caffeine pills, high school memorabilia, fingernail clippings, lava lamp).

To derive a list of cues applicable to a variety of PLSs, a panel of three judges reviewed the list of 725 unique cues, eliminating cues they thought would be rare (e.g., dead moths, spent bullet shells) and cues they thought would be hard to distinguish in the context of PLSs (e.g., it would be hard to differentiate "cramped" from "crowded").

A new panel of 4 judges consensually categorized the cues as either global or specific. The global cues exemplify the approach of Kasmar, using primarily adjectival rating scales to assess the configural aspects of the PLSs (e.g., decorated). For this method, psychological judgments of multiple observers

are required to establish and document the reproducibility and sensitivity of the assessments. For the specific itemization method (e.g., computer), coders simply have to record whether the items were present. These items do not involve such an element of judgment so they can probably be judged by only one coder if time or labor is in short supply. Of course, having only a single judge increases the risk of overlooking items. The cues from Phase 2 categorized as global were combined with the list of 21 adjective pairs identified in Phase 1.

The cues (global and specific) were listed on the instrument under the following categories: odors, noise, lighting, atmosphere, temperature, general state of room, characteristics of walls, characteristics of the floor, characteristics of the window coverings, furniture, bed linens, wall décor, books, magazines, cds/records, stationery, electronic equipment, kitchen and cooking equipment, beauty products, clothing, bags, and miscellaneous items. In addition, it would have been impractical to name every single piece of athletic equipment, medication, and plant. Therefore, we created write-in options, for the categories of athletic equipment, collections, food, games, jewelry, labels, medication, musical instruments, pets, plants, religious artifacts, specialized clothing, tools, toys, and weapons.

DIVIDING THE PLSCI

Pilot studies indicated that it took about 45 minutes for a single coder to catalogue an average PLS. Because we would only have access to the PLSs for short periods (i.e., less than 30 minutes), we split the PLSCI into four sections that were subsequently divided among three coders. As noted above, the cues on the PLSCI had been consensually divided into two types: global descriptors that require judgment by the coders and more specific items that require a smaller element of judgment. Form A contained the global descriptors and was completed by all three coders. The specific-content items were divided into three forms (B, C, & D), each of which was completed by only one coder; thus Coder 1 completed forms A and B, Coder 2 completed forms A and C, and Coder 3 completed forms A and D. This step of dividing the PLSCI into sections reduced the time taken to code a PLS but still permitted us to monitor intercoder agreement for the global descriptors (Form A). This division of labor cut assessment time down to approximately 20 minutes for each PLS.

The first part (Form A) of the divided PLSCI contained the global descriptors and was completed by all three coders. Bipolar ratings were made

on 7-point scales concerning odor (e.g., weak-strong), noise (e.g., quiet-noisy), lighting (e.g., dim or dark-well-lit), atmosphere (e.g., stuffy-drafty), temperature (e.g., cold-hot), general state of PLS (e.g., gloomy-cheerful), and the quantity and level of organization of clothing, books, magazines, CDs or records, and stationery. An aggregate rating was obtained by computing the arithmetic mean of the three coders' independent ratings.

The portion of the PLSCI (Forms B, C, and D) containing specific-content items (e.g., desk) was divided equally among the three coders. Each coder's section contained a list of items found in PLSs. The coders recorded the presence and condition of an item by circling the appropriate item on the list. Form B included information about the walls and ceilings (e.g., wallpaper), the subject matter of posters, paintings, and photos (e.g., movie stars), the floor (e.g., polished wood), carpet patterns and color (e.g., solid), window coverings (e.g., blinds, closed), and miscellaneous items (e.g., food wrappers). Form C included furniture (e.g., twin bed), electronic equipment (e.g., fax machine), books and magazines (e.g., biography), and CDs or records (e.g., country). Form D included broad categories of items: stationery (e.g., scissors), beauty products (e.g., perfume), bags (e.g., shoulder bag), miscellaneous categories (e.g., plants), and clothing (e.g., gloves).

Each section of the PLSCI had space for the coders to manually write in cues that were not already present in the instrument. If a cue was repeatedly added to the inventory early in the study, we added a new category for it on the PLSCI. Over the course of the study, we added 9 cues (e.g., black light) to the instrument. In addition, there were 146 cues that were not added to the instrument but were recorded with sufficient regularity to warrant inclusion in the analyses reported here. Seven of these write-in cues were clarifications of categories already in the instrument; for example, the method of hanging category was qualified by pins, tape, and so on.

The addition of these extra cues illustrates the usefulness of this write-in step. It allowed us to accommodate the features (e.g., black lights) relatively common in this sample (i.e., North American college students) without having to include them as categories that would be unused in other samples (e.g., nuns). Thus, although the current PLSCI may not provide a comprehensive inventory for some populations (e.g., prisoners, nursing home residents), it does provide a means for augmenting the standard items with elements unique to individual assessment environments. The complete PLSCI is available from the first author.

CODING PROCEDURE

The three coders entered each PLS together and started by independently completing Form A (global descriptors). Next the coders moved on to the specific-content items (i.e., Forms B, C, and D). The coders were not permitted to touch or move any items so their codings reflect only what could be seen by walking around the PLSs. Clearly, this procedure does not capture the many items stored in drawers, wardrobes, cupboards, boxes, and other storage containers, and all findings should be interpreted with this fact in mind. For the specific-content items, coders were permitted to communicate so they could point out items the other coders might miss. For instance, if in the course of recording the window coverings (Form B) Coder 1 noticed a book on the windowsill that could be easily missed, then Coder 1 should alert Coder 2 (who was responsible for books) to the book's presence. However, even after splitting the PLSCI into sections and even with one another's help, each coder was still responsible for recording a large number of cues, and it is quite possible that some visible cues were missed and not recorded on the PLSCI.

TARGET PARTICIPANTS

The instrument was tested on the PLSs of 83 participants who volunteered to have their PLSs assessed in return for receiving feedback based on their spaces. The participants were college students attending or recently graduated from the University of California, Berkeley. On average, participants were 21.9 years old (SD = 2.8), and the sample was reasonably diverse in terms of gender (65% women, 30% men, 5% did not specify) and ethnicity (42% Asian, 30% White, 20% other ethnicity, 8% did not specify). Participants were specifically asked not to tidy or alter their PLSs and were informed that the PLSs would be assessed under conditions of anonymity and confidentiality. The coders had no contact with the participants. Coders were let into the PLSs by a researcher who had been given permission and means to access the PLSs by the occupant. All photos of occupants and references to occupants' names were covered before the coders entered the PLSs. Although these PLSs were serving college students, many of them were located off-campus in houses and apartments. Such PLSs have become typical for many urban unmarried young adults and thus hold wider ecological implications than mere student accommodation.

RESULTS AND DISCUSSION

PSYCHOMETRIC EVALUATION OF THE INSTRUMENT

Using the PLSCI, we coded 83 PLSs successfully and comprehensively. We added only nine cues not accounted for in the original PLSCI. Thus, the current version of the PLSCI represents a combination of an a priori set of cues supplemented by a small set of cues that arose in field research.

Splitting the PLSCI into sections had several advantages. First, simply by reducing the number of cues recorded by each judge, we reduced the time taken to code each PLS. Second, the division of the PLSCI enabled the coders to develop an expertise in a narrower range of items, which facilitated more time-efficient coding. Third, the division allowed us to monitor the reliability and sensitivity of the global descriptors in Form A.

A cue inventory should meet the psychometric criteria required for standard environmental assessment instruments (Craik & Feimer, 1987)—reliability (or generalizability) and sensitivity.

Reliability of global descriptors. Reliability can be conceptualized as the reproducibility of a measurement or the extent to which the assessments generalize across observers and occasions. Reliability is the first psychometric requirement that must be met by any assessment instrument. To determine whether the assessments of the global features of PLSs meet this fundamental criterion, this section summarizes and considers the evidence regarding their reliability.

To gauge the reliability of the composite of the three coders' ratings, we computed the coefficient alpha reliability. Across the 42 global attributes examined, the alpha reliability averaged .72. Although this is a respectable level of reliability, the alpha varied considerably across the attributes. The alpha reliabilities, shown in the first data column of Table 1, are a function of the number of coders and the mean intercoder agreement. The attributes in Table 1 are arranged in terms of their alpha values, with the most reliable attributes shown at the top of the table. The attribute with the strongest reliability was decorated (vs. undecorated) with an alpha of .92. The attribute with the weakest reliability was modern (vs. old fashioned) with an alpha of .35.

More than one half the attributes (52%) had a value of .70 or greater. More than three fourths (79%) of the attributes had an alpha of .60 or greater.

TABLE 1
Global Environmental Attributes: Reliability and Sensitivity of Ratings Aggregated Across Three Coders

	Reliability		*Sensitivity*	
Attribute	α	N	F	*Sig.*
Decorated (vs. undecorated)	.92	83	10.47	.000
Neat (vs. messy)	.91	81	10.82	.000
CDs: Many (vs. few)	.90	80	8.71	.000
Clothing: Everywhere (vs. none visible)	.89	83	7.48	.000
Books: Many (vs. few)	.88	83	5.26	.000
Well-organized (vs. poorly)	.84	83	5.64	.000
Cluttered (vs. uncluttered)	.84	82	6.12	.000
Well-lit (vs.dark) overall	.80	77	3.20	.000
Hot (vs. cold) temperature	.78	81	4.19	.000
Books: Organized (vs. disorganized)	.78	68	3.82	.000
Colorful (vs. drab)	.77	83	3.18	.000
CDs: Organized (vs. disorganized)	.77	51	2.98	.000
Magazines: Many (vs. few)	.77	83	3.78	.000
Cheerful (vs. gloomy)	.76	83	3.79	.000
Clean (vs. dirty)	.76	82	3.89	.000
Magazines: Organized (vs. disorganized)	.76	15	.29	.999
Good (vs. poor) condition	.75	83	3.65	.000
Large (vs. small)	.74	83	2.67	.000
Well-lit (vs. dark) naturally	.73	76	3.03	.000
Stationary: Many items (vs. few)	.72	83	2.92	.000
Stationary: Organized (vs. disorganized)	.71	51	3.03	.000
Full (vs. empty)	.70	83	2.94	.000
Roomy (vs. cramped)	.69	83	2.70	.000
Inviting (vs. repelling)	.68	83	3.11	.000
Drafty (vs. stuffy) atmosphere	.67	81	2.65	.000
Well-lit (vs. dark) artificial	.67	65	2.22	.000
Distinctive (vs. ordinary)	.66	82	2.23	.000
Books: Varied (vs. homogenous)	.66	58	1.48	.023
Expensive (vs. cheap)	.64	82	2.65	.000
Multiple (vs. single) purpose	.64	83	1.50	.014
Stylish (vs. unstylish)	.61	83	2.54	.000

(continued)

Although there has been some debate concerning the minimum level of alpha reliability that measures should achieve (John & Benet-Martinez, 2000), alphas of around .70 are often suggested (Nunnally, 1978). According to the Spearman-Brown prophesy formula, the addition of one more judge would increase the alpha reliability of the composites such that 30 of the 42 attributes (71%) would reach alpha levels of at least .70. We recommend that

TABLE 1 (continued)

	Reliability		*Sensitivity*	
Attribute	α	N	F	*Sig.*
New (vs. old)	.62	83	2.15	.000
CDs: Varied (vs. homogenous)	.60	33	1.12	.305
Clothing: Strewn about (vs. neatly organized)	.59	54	2.15	.000
Comfortable (vs. uncomfortable)	.59	82	1.94	.000
Noisy (vs. quiet) in the room	.55	82	1.80	.001
Noisy (vs. quiet) in the house	.55	83	1.59	.006
Magazines: Varied (vs. homogenous)	.54	8	—	—
Strong (vs. weak) odor	.53	80	1.08	.341
Fresh (vs. stale) atmosphere	.51	79	1.46	.022
Noisy (vs. quiet) outside	.48	83	1.77	.001
Modern (vs. old-fashioned)	.35	81	1.00	.500

NOTE: All ratings made on 7-point scales. CD includes CDs and records. Odor merely specifies the strength of odor, not the type (e.g., dank, perfume), although this was recorded.

future researchers use Table 1 as a guide to how many coders they will need. For most attributes, three coders should be sufficiently reliable. However, for the less reliably coded attributes, researchers may need to use four or even five coders, especially if they do not anticipate assessing a wide range of PLSs.

The coders were required to make subtle discriminations among the attributes of the PLSs (e.g., discriminating neat from well organized). We were concerned that it may have taken the coders some time to become familiar with these discriminations with the effect that the PLSs coded at the beginning of the study would not be coded reliably. To test the possibility that agreement among coders increased as they became more familiar with the instrument and procedures, we computed the intercoder agreement and alpha reliability separately for the first and last quartiles assessed. We used a paired-samples *t* test to examine whether the PLSs assessed early in the study elicited less reliable ratings than those assessed late. No significant difference was shown on *t* tests computed across attributes on the alpha reliabilities between the PLSs assessed early (mean alpha = .76, *SD* = .37) and late (mean alpha = .71, *SD* = .44) in the current study, $t(40) = 1.4$, *ns*. These findings show that the instrument was not subject to practice effects and suggest that untrained coders can rate PLSs just as reliably as experienced coders. More generally, our reliability analyses suggest that the global attributes of PLSs can be assessed reliably.

Sensitivity of global descriptors. When the reliability has been established, the next question to consider is the sensitivity of the descriptors; that is, do the descriptors differentiate among the places assessed? To test this question, we conducted a one-way ANOVA on the coders' ratings for each of the attributes with the PLSs (1 to 83) as variables. The *F* values and significance levels from these analyses are shown in the third and fourth data columns of Table 1. A significant main effect of PLS indicates that judges differentiated the PLSs on that attribute. Overall, the results suggest that the vast majority of PLSs could be differentiated in terms of these attributes with the only exceptions being the degree to which magazines were organized, the variety of CDs, strength of odor, and modern (vs. old fashioned).

DO THE SPECIFIC CODINGS PROVIDE INFORMATION NOT CAPTURED BY THE GLOBAL DESCRIPTORS? CASE STUDIES

The PLSCI characterizes PLSs at two levels—rating global attributes and recording specific-content items. Clearly, these two methods will show some overlap—a PLS with many posters, paintings, photos, and other adornments will be rated as high on decorated, and a PLS with barely any items recorded in it will be rated as low on full. However, are these methods redundant? If the two methods do not provide unique information, then we can dispense with one of them. As noted above, Kasmar (1970) already documented the usefulness of global descriptors, which capture configural aspects of the PLSs and supposedly provide effective summaries of individual items. Moreover, it takes longer to code specific-content items than it does to rate global attributes. It is, therefore, important to establish what, if anything, the specific codings provide over and above the global ratings.

In our approach to evaluating the relative contributions of global ratings and specific codings, we conducted comparisons of the specific items found in two pairs of PLSs rated as similar to one another in terms of global attributes. To the extent the specific items were dissimilar across the paired PLSs, it can be argued that the specific codings provided information not captured by the global ratings.

Case studies. One way to explore the value of documenting specific attributes over and above global attributes is to compare PLSs that are very similar in terms of global attributes to see how closely the PLSs match up in terms of specific-content items. To do this, it is first necessary to identify PLSs that are very similar in terms of the global attributes. There are two ways of conceptualizing similarity. The first way is in terms of overall profile; that is, two PLSs are similar if they have a similar pattern of ratings across the attributes.

Figure 1: PLS #04: View of a Personal Living Space With Many Specific-Content Items Recorded in It

Figure 2: PLS #52: View of a Personal Living Space With Few Specific-Content Items Recorded in It

Such similarity is gauged by a correlation between PLSs, computed across attributes. A second way of conceptualizing similarity is in terms of absolute discrepancy; that is, two PLSs are similar if they are rated with similar values across the attributes. Such similarity is gauged by the magnitude of the absolute discrepancy between the ratings of the PLSs. Although these two conceptualizations are theoretically independent, they are both legitimate ways of understanding similarity.

Table 2 shows the specific-content items that were recorded for PLS #50 (in the left-hand column) and for PLS #67 (in the right-hand column). These

TABLE 2:
Specific Items Recorded in Two Personal Living Spaces (PLSs) With Similar Global Characteristics (as Measured by Correlation Across Attributes)

Items From Category	*PLS #50: Rented Room in Apartment, Occupant is Male, Asian, Age 20 Years*	*PLS #67, Rented Room in Student Dormitory, Occupant is Female, Hispanic, Age 20 Years*
Room features	Painted walls, *10% covered by décor*, *standard sized rug*, *no window coverings* [3U/1S/4T]	*Painted walls, 50% covered by décor*, *wall-to-wall carpet*, *curtains* [3U/1S/4T]
Furniture & linens	Bed, desk, chair, drawers, wardrobe, *stereo stand*, garbage can (*rated as 4/5 on full*), bedspread, comforter [2U/8S/10T]	Bed, desk, chair, *table*, drawers, wardrobe, *bookshelves*, *file cabinets*, garbage can (*rated as 2/5* on full), *bed skirt*, bedspread, *blankets*, comforter [6U/8S/14T]
Wall décor	Poster (*movie star*) [1U/0S/1T]	Posters (*baby*, *fantasy*), photos (*fantasy*, *friends*), *art* [5U/0S/5T]
Clocks, calendars, & mirrors	Mirror, clock, décor hung by nails [0U/3S/3T]	*Calendar*, mirror, clock (*fast*), décor hung by nails and *tape* [3U/3S/6T]
Books & magazines	Books (academic, *computer*, fiction, *political*) [2U/2S/4T]	Books (academic, *dream*, fiction, *philosophy*, *reference*, *travel*), magazines (*entertainment*, *fashion*, *health*, *music*), *catalogues*, *photo albums* [10U/2S/12T]
CDs	CDs (*dance*, R&B, *rap/hip-hop*, soundtracks, *world/ethnic*) [3U/2S/5T]	CDs (*alternative*, *classical/opera*, *folk*, *instrumental*, *modern rock*, *new age*, *pop*, R&B, soundtracks), *CD-ROM game* [8U/2S/10T]
Stationery	*Folders*, pens, *floppy disks* [2U/1S/3T]	*Hi-lighter*, *in-trays*, *marker pens*, *paper clips*, *pencils*, pens [5U/1S/6T]
Electronic equipment	CD player, tape player, radio, *integrated stereo*, *Mac* computer, *fan* [3U/3S/6T]	CD player, tape player, radio *boombox*, *printer*, *TV*, *VCR*, *phone*, *answering machine*, *heater* [7U/3S/10T]
Kitchen & cooking	— [0U/0S/0T]	*Cooking utensils*, *fridge*, *microwave*, *coffee maker*, *plates*, *bowl*, *cutlery* [7U/0S/7T]

Beauty products	Perfume/cologne, *toilet paper* [1U/1S/2T]	*Hair gel*, *lotion*, *make up*, perfume/cologne, *razor*, *toothbrush*, *contact lens solution*, *miscellaneous item (eyelash curler)* [7U/1S/8T]
Clothing	*Athletic bag* [1U/0S/1T]	*Tote bag*, *shoulder bag* [2U/0S/2T]
Miscellaneous items	Beauty equipment, *bills*, *check book*, *cigarettes*, flyers, food wrappers, *laundry basket*, postcards, *receipts*, *scrap notes*, *smoke alarm*, stuffed animals, *tissues* [8U/5S/13T]	Beauty equipment, *boxes*, *candle holders*, *candles*, *cards*, *cleaning supplies*, *flowers (dried, fake, fresh)*, flyers, food wrappers, *glasses*, *hair dryers*, *health*, *products*, *iron*, *knickknacks*, *letters*, *mail*, *memorabilia (college)*, *plates*, postcards, *room* freshener, stuffed animals, *umbrellas*, *vases*, *wallets* [21U/5S/26T]
Other categories	*Athletic equipment (tennis racket)* [1U/0S/1T]	*Collections*, *food*(*sweets*, *drinks*), *medication* (*cold medicine*, *pain killers*), *plants* (*arranged*), *religious artifacts* (*Western*) [7U/0S/7T]
Overlap across two PLSs		
Unique items	27 (51%)	91 (78%)
Shared items	26 (49%)	26 (22%)
Total number of items	53	117

NOTE: Italicized text indicates that the item was found in only one of the two rooms. The first number in brackets (denoted by *U* for unique) indicates the number of items found in only one of the two rooms, the second number (denoted by *S* for shared) indicates the number of items found in both rooms, and third number (denoted by *T* for total) indicates the total number of items listed for that room. "—" indicates that no items were recorded in the PLS for this category.

two PLSs had very similar profiles on the global descriptors, correlating 0.82 across the 42 descriptors. Despite their similar global profiles, it is immediately apparent that PLS #67 had many more items in it than did PLS #50; the last section in Table 2 indicates that PLS #67 had more than twice as many items as PLS #50. Moreover, it is not simply a matter of PLS #67 having all the items in PLS #50 and more—only 26 items were common to both PLSs.

To examine more systematically the variation across PLSs in terms of quantity of specific elements, we computed 14 variables to index the number of items recorded for each PLS in 14 different categories. These categories are listed in the first column of Table 2. As might be expected, across the 83 PLSs, the broadest category miscellaneous items had the most items recorded, with an average of 18.9 elements per PLS, and the category kitchen and cooking equipment had the fewest elements, with an average of 0.7. Overall, an average of 89.7 elements were recorded per PLS, with a minimum of 45 and a maximum of 139. Examples of rooms with many and few elements are shown in Figures 1 and 2, respectively.

The quantity variables correlated strongly with conceptually related global descriptors and weakly with conceptually unrelated descriptors. For example, the descriptor documenting the quantity of books correlated strongly ($r = .70$, $p < .001$) with the variable indexing the number of items recorded in the books and magazines category but weakly ($r = –.15$, *ns*) with the variable indexing the number of items recorded in the wall décor category. Yet the descriptor decorated correlated only .12 (*ns*) with the number of items in the books and magazines category, and .58 ($p < .001$) with the number of items in the wall décor category. Similarly, a variable summarizing the number of items recorded in all 13 of the other quantity variables correlated with cluttered ($r = .50$, $p < .001$) and full ($r = .45$, $p < .001$), but not with comfortable ($r = .09$, *ns*) and modern ($r = .02$, *ns*). Together, these patterns of convergent and discriminant correlations support the construct validity of both measures.

A perusal of the items in Table 2 that are unique to each PLS and that are shared by the PLSs provides a far more concrete impression of what the PLSs are like than is provided by global ratings. However, perhaps the differences between the two PLSs can be explained by differences in the levels of the global ratings, a difference not captured by the correlational index of similarity but captured by the absolute-discrepancy index.

We conducted such an analysis using two PLSs that were very similar on the global descriptors in terms of absolute discrepancy: On the global descriptors, the two PLSs differed by an average of only .53 rating-scale points across the 42 descriptors. The PLSs differed in total number of items coded, although not nearly as dramatically as the previous cases. For two

PLSs that were selected based on their absolute similarity, we again found that relatively few items (21) were common to both PLSs. These differences cannot be explained in terms of gender differences because both PLSs were occupied by women.

Thus, although global ratings are essential for providing configural information about PLSs, they fail to provide the concrete details that are needed to convey what a PLS is like. As Tognoli (1987) proposed and as our case studies suggest, to characterize a PLS fully, one must also focus on a more specific level of analysis, recording the specific-content items in it. These concrete details may provide the key to examining the psychological issues posed by the study of residential environments. For instance, we are intrigued by the psychological implications of the finding that more than one third of occupants set their clocks ahead of the correct time, versus less than 4% set behind. This discovery, made possible by thoroughly coding the environments, suggests one mechanism by which individuals might use features of the physical environment to regulate their behaviors just as interactionist theories have suggested individuals use their social environments to match and reinforce their dispositions (Buss, 1987).

FUTURE DIRECTIONS

We have noted in passing a number of issues suitable for future research. We reiterate and summarize these issues and provide a series of suggestions for future PLS research. First, the PLSs examined here represent only a subcategory of the PLSs in which individuals reside. Future research should examine the attributes of other important PLSs including PLSs within family households, boarding houses, residential centers for the elderly, and even the virtual PLSs on the Internet, outfitted, decorated, and personalized as dwellings for electronic avatars (J. R. Gosling, 2000).

A second issue is that even our detailed recordings left some PLS features undocumented. The presence of many objects was systematically recorded; however, the configuration and state of the objects was not. Is the information conveyed by the mere presence of childhood memorabilia more important than the information found in the exact form of the memorabilia, its state, and location? Does a battered childhood baseball glove sitting on the mantelpiece say something different from a barely used baseball glove sitting in a crate on top of the wardrobe? We suspect these details are important. The question facing researchers is whether it is worth adding such details to what is already a labor-intensive process.

Moreover, as noted above, more than 100 cues were recorded that did not fall into any of the PLSCI categories. Given the sheer diversity of PLSs and the enormous number and variety of potential items to be found in them, we suspect that no workable coding scheme could ever be absolutely comprehensive. Researchers must strike a balance between comprehensiveness on one hand and feasibility on the other hand. We believe the PLSCI represents one reasonable resolution to this trade-off. In addition, our experience underscores the usefulness of retaining write-in options and the flexibility they bring.

The third issue is that we assessed only what was visible. Although the coders were free to peer into open cupboards and get down on their hands and knees to look under beds and desks, we had not obtained permission to open drawers and cupboards or to even move objects in the PLSs. Thus, although we assessed the ways in which individuals personalize their PLSs, we could not record those items that were out of view, either because they were private or because they are kept out of sight by convention (e.g., socks). In this sense, our assessment procedure is akin to the preliminary stage of typical scene-of-the-crime (SOC) routines in criminal investigations, in which careful observations are made without the setting being trampled upon (Federal Bureau of Investigation, undated; Fox & Cunningham, 1992; Technical Working Group on Crime Scene Investigation, 2000). Without doubt, the categories we assessed varied in the degree to which they were visible. For example, it is conventional to keep books on bookshelves, where they can be seen, and to keep clothes in wardrobes and drawers, where they are less easy to observe. Thus, it is likely that our assessments were more comprehensive and representative of some categories (e.g., books) than of others (e.g., clothes). We believe that the items people choose to display or leave, as physical residues of their behaviors are particularly interesting from a psychological perspective (S. D. Gosling, Ko, Mannarelli, & Morris, 2002; Woodward, 2001; Zeisel, 1981). Nevertheless, it would be interesting to assess the hidden elements of PLSs and strive for a fuller inventory of possessions (participants and research-ethics committees permitting!). How would a full-fledged under-the-toilet, behind-the-bottom-drawer search compare with our initial-SOC-style search of the same PLSs?

A fourth concern with the current research is that we relied on volunteers. It is plausible to imagine that this selection process provides an unrepresentative sample of PLSs, perhaps excluding PLSs that were particularly messy or particularly tidy. This issue is not unique to the current research, and it is not clear how one would overcome the ethical and logistical obstacles that stand in the way to solving it except through substantial monetary inducements.

Nevertheless, documenting the differences between volunteer and nonvolunteer PLSs remains an intriguing, albeit remote, possibility.

To maintain the target participants' anonymity we had to let them know when their PLS would be assessed so they could arrange to be away and so they could cover any identifying information. This raises the fifth potential issue: Participants may have tidied or altered their PLSs for self-presentational purposes before the assessment team arrived. However, there are several reasons to think that the PLSs were not tidied or altered. First, we believe that occupants complied with our specific request not to tidy or alter their PLSs because the PLSs were assessed under conditions of anonymity and confidentiality. Second, the main incentive for the occupants to take part in this research was to receive feedback on their PLSs. We reminded participants that meaningful feedback depended on assessors seeing the environments in their unaltered state. Third, occupants' peers confidentially rated how much they thought the PLSs had been altered for the assessment; the mean rating was 1.4 on a scale ranging from 1 (*very little*) to 5 (*very much*), indicating the PLSs had not been altered much. Nevertheless, if research-ethics committees would allow it, it would be interesting to examine perhaps through prior surreptitious photographs by housemates how much participants alter their PLSs before an assessment and exactly which elements are altered. And how do occupants tailor their spaces for specific anticipated audiences? What would have happened if the participants in the current study expected our assessment team to be composed of pledge candidates versus sorority sisters (for fraternity PLSs and vice versa) versus parents versus deans and assistant deans of students?

CONCLUSION

PLSs support many of the functions and meanings of home, affording privacy, refuge, security, continuity, a medium for personalization and self-representation, and a venue for regulated social interactions. To provide a foundation for future research on PLSs, we have introduced an instrument—the PLSCI—designed to document the features of PLSs. We have established the reliability and sensitivity of the instrument in one common form of PLS—student accommodations, such as rented rooms in houses, apartments, dormitories, and co-ops. We conclude that global ratings and specific codings provide complementary yet distinct characterizations of PLSs. More generally, the investigations reported here bring to the fore a ubiquitous yet hitherto neglected environmental context in which to examine the broad

range of psychological and cultural issues posed by the study of residential environments.

REFERENCES

Altman, I. (1975). *The environment and social behavior: Privacy, personal space, territory, crowding*. Monterey, CA: Brooks/Cole.

Buss, D. M. (1987). Selection, evocation, and manipulation. *Journal of Personality and Social Psychology*, *53*, 1214-1221.

Craik, K. H. (1971). The assessment of places. In P. McReynolds (Ed.), *Advances in psychological assessment* (Vol. 2, pp. 40-52). Palo Alto, CA: Science and Behavior Books.

Craik, K. H., & Feimer, N. R. (1987). Environmental assessment. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (Vol. 2, pp. 891-917). New York: John Wiley.

Csikszentmihalyi, M., & Rochberg-Halton, E. (1981). *The meaning of things*. London: Cambridge University Press.

Federal Bureau of Investigation. (n.d.). *Suggested guidelines for establishing evidence response teams*. Washington, DC: U.S. Department of Justice.

Fox, R. H., & Cunningham, C. L. (1992). *Crime scene search and physical evidence handbook*. Boulder, CO: Paladin.

Gosling, J. R. (2000, November). *The virtual worlds: New spaces, new selves* (Working paper). Lancaster, UK: Lancaster University Management School, Management Development Division.

Gosling, S. D., Craik, K. H., Martin, N. R., & Pryor, M. R. (2005). Material attributes of personal living spaces. *Home Cultures, 2,* 51-88.

Gosling, S. D., Ko, S. J., Mannarelli, T., & Morris, M. E. (2002). A room with a cue: Judgments of personality based on offices and bedrooms. *Journal of Personality and Social Psychology*, *82*, 379-398.

John, O. P., & Benet-Martinez, V. (2000). Measurement, scale construction, and reliability. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social psychology* (pp. 339-369). Cambridge, UK: Cambridge University Press.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 102-138). New York: Guilford.

Kasmar, J. V. (1970). The development of a usable lexicon of environmental descriptors. *Environment and Behavior, 2*, 153-169.

Laumann, E. O., & House, J. (1970). Living room styles and social attributes: The patterning of material artifacts in a modern urban community. *Sociology and Social Research*, *54*, 321-342.

McCrae, R. R., & Costa, P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality theory and research* (pp. 139-153). New York: Guilford.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Technical Working Group on Crime Scene Investigation. (2000). *Crime scene investigation: A guide for law enforcement*. Washington, DC: U.S. Department of Justice, Office of Justice Programs.

Tognoli, J. (1987). Residential environments. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (Vol. 2, pp. 655-690). New York: John Wiley.

Vinsel, A., Brown, B. B., Altman, I., & Foss, C. (1980). Privacy regulation, territorial displays, and effectiveness of individual functioning. *Journal of Personality and Social Psychology*, *39*, 1104-1115.

Woodward, I. (2001). Domestic objects and the taste epiphany: A resource for consumption methodology. *Journal of Material Culture*, *6*, 115-136.

Zeisel, J. (1981). *Inquiry by design: Tools for environment-behavior research*. Monterey, CA: Brooks/Cole.