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HAPPINESS SURVEYS: SOME COMPARABILITY ISSUES AND AN EXPLORATORY SURVEY BASED ON JUST PERCEIVABLE INCREMENTS

ABSTRACT. Most questionnaires to obtain reports of happiness are primitive with the results obtained of low (interpersonal) comparability. This paper argues that happiness is intrinsically cardinally measurable and comparable though with many difficulties. Moreover, a sophisticated questionnaire was developed and used to obtain more accurate and interpersonally comparable reports of happiness based on the concept of just perceivable increments of pleasure/pain. Comparisons with the traditional questionnaire are also made (by the respondents) to show the superiority of the sophisticated questionnaire.

KEY WORDS: happiness, welfare, well-being, interpersonal comparison, cardinal utility

INTRODUCTION

Arguably, the study of happiness is a very important study. For most people, happiness is the main, if not the only, ultimate objective in life. Moreover, a happy person also tends to be more efficient at work, more friendly socially, and less of a problem in law and order. However, the study of happiness is seriously hampered by the difficulty of obtaining reliable and comparable data. This paper addresses the issue of interpersonal comparability in reports of self-avowed happiness. The problem arises because the same amount of happiness may be described differently, and different amounts of happiness may be described by the same term. Section 1 suggests a very simple method (of pinning down the level of zero amount of happiness) to improve comparability and addresses a number of conceptual issues on measurability and comparability. However, other related issues like the multi-dimensional nature of subjective well-being are beyond the scope of this paper. Section 2 reports on a survey questionnaire developed and undertaken to overcome the difficulty of comparability, using the concept of just perceivable increments of pleasure. Due to the fairly elaborate nature of

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the questionnaire, its exploratory nature, and the limited resources of the author, the actual survey was not done for a representative sample. Instead, a class of graduate students ($n = 41$) was used for the experiment. Hopefully, if the method is deemed useable, surveys based on it may be used for more representative samples, perhaps after substantial revisions. Section 2 is written fairly independent of Section 1. Thus, readers not wanting to follow the conceptual discussion in Section 1 may skip it.

1. SOME ISSUES OF MEASURABILITY AND COMPARABILITY

A common question used in happiness surveys asks the respondents to check one of the following: very happy; fairly (or pretty) happy; not too happy; unhappy. While this method has the advantage of simplicity, it unnecessarily increases the difficulty of comparability. The category "not too happy" may mean a relatively small amount of happiness, no (net) happiness, or a relatively small amount of unhappiness. Moreover, this relatively small amount of negative or positive amount of happiness is subjectively determined by the respondents and hence not interpersonally comparable.

Though different persons may select different adjectives or numbers to describe the amount of happiness, there is one level of happiness that is more objectively identifiable, the level of zero (net) happiness. No matter how large or small gross happiness an individual may experience, if it is roughly equal to, in the opinion of the individual, the amount of unhappiness (pain or suffering), the net amount of happiness is zero and has an interpersonal significance in comparability. Hence an intertemporal and interregional comparable piece of information is the proportion of people having zero, positive, and negative net happiness. Thus a simple way to reduce the difficulty of comparability is to determine the dividing-line of zero happiness.

A simple way to determine the dividing-line of zero happiness is to ask respondents to check one of the following: very happy; fairly happy; somewhat (or slightly) happy; neither happy nor unhappy; unhappy; very unhappy. However, to achieve a more considered response, respondents could be asked the following question. (Despite its length and complication, in my experience, respondents had no difficulty comprehending and answering it.)

Question:

Over all my past that I can recall, I have had times of happiness (including sensuous pleasures, spiritual well being, i.e. all forms of nice feelings) and times of unhappiness (including physical pain, mental sufferings, i.e. all forms of unhappy feelings) of different duration and intensities, more or less like the following graph (ignoring times of neither happy nor unhappy feelings):

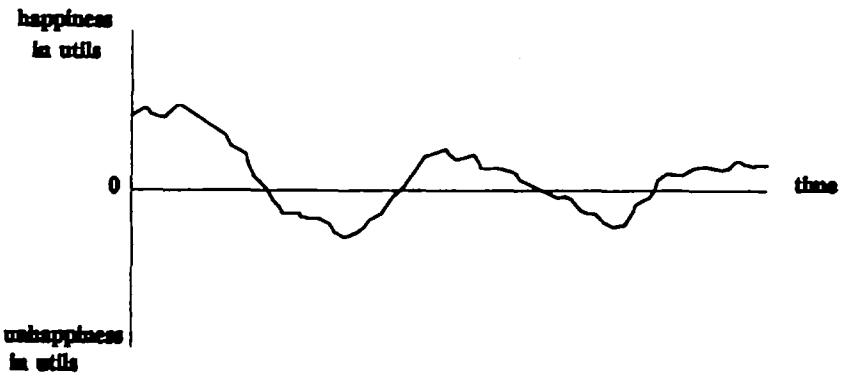


Figure 1

If I add up the areas above the line of neutrality (i.e. the total amount of happiness I have experienced) and also add up the areas under the line (i.e. the total amount of pain, suffering or unhappiness), and compare the two, I shall say that –

(a) total happiness far exceeds total unhappiness
(b) total happiness somewhat exceeds total unhappiness
(c) total happiness equals total unhappiness
(d) total unhappiness somewhat exceeds total happiness
(e) total unhappiness far exceeds total happiness.

The Concept of Happiness and Its Cardinal Measurability

The reason most researchers shy away from the zero level of happiness may partly be explained by their hesitation to regard happiness as a fully cardinal quantity measurable at the ratio scale with a well defined zero point, at least in principle. This hesitation is probably made worse by the so-called ordinalist revolution in economics. For the positive theory of consumption under certainty, economists need only to work with the ordinal aspect of the utility function since only

rankings of alternative bundles of goods are relevant. Occam's razor requires the abstraction from the irrelevant aspect of cardinal utility. In hailing this as a significant theoretical advance, many economists have been over-zealous in insisting on using only ordinal utility even in areas (e.g. social choice) where cardinal utility is necessary or at least useful. This must be regarded as the fallacy of misplaced abstraction.

The fallacy of misplaced abstraction is so widespread as to affect not only economists but also sociologists and psychologists working in the area of happiness where cardinal measurement is so important. For example, in his *Conditions of Happiness*, Veenhoven (1984, p. 61) writes:

> ... would it then be possible to assess happiness at the so-called 'ratio-level' of measurement? This requires happiness to be rated in equal intervals and that an absolute zero point of happiness exists. Neither of these requirements can be met. Hence the best we can do is to say that someone is 'more' happy than some (one) else. We cannot say 'how much' happier he is. We cannot say so even when talking about our own happiness. I can say that I am happier now than when I was a teenager, but I cannot say that I am now twice as happy. This means that happiness can be measured only at the 'ordinal' level. ... Unfortunately not all investigators seem to realize this limitation.

However, both investigators and lay-persons use "happiness" and "unhappiness" with well-understood intrinsic meanings. If one is happy/unhappy, it seems natural to measure his happiness as positive/negative. If one is neither happy nor unhappy, or if happiness just offsets unhappiness, one's (net) happiness is zero. I have absolutely no difficulty in saying that my happiness is positive when I am enjoying poetry, delicious food, etc., negative when I am very sick, and zero (or close to zero) for most of the time. It is true that I cannot say that my happiness in 1995 was exactly 3.4506 times my happiness in 1967. However, I am absolutely certain that it is somewhere between two and six times. The lack of precision is due to imperfect memory, not to the lack of cardinal measurability. In principle, it is no different from the fact that I cannot say that the amount of water I drank this morning was exactly 1.2143 times the amount of water I drank yesterday. It seems clear to me that my happiness is measurable in a ratio-scale and I don't believe that I am an exception here.

In fact, if the cardinal comparability of happiness were to be rejected on the ground of the inability of an individual to say that he was exactly how many times happier in year x than in year

y, even the ordinal measurability of happiness would have to be rejected. Honestly, I cannot say whether I was happier in 1986 or 1987 or approximately equally happy (the probability of exactly equally happy is almost of measure zero). Either one of the three seems possible, partly because of the imperfection in my memory and partly because the amounts of my happiness in those two years do not differ a great deal. What I can say with certainty is that my happiness in either of those two years is not more than twice that in the other year. (I cannot say that I was approximately equally happy in those two years because I don't think that a figure of say 1.5 can be said to be approximately equal to one.) However, this is in the language of (imperfect) cardinal measurability, not just (perfect or imperfect) ordinal comparability.

Given three well-defined situations *A*, *B*, and *C*, suppose that an individual is happier at *A* than at *B*, and happier at *B* than at *C*. In other words, $H(A) > H(B) > H(C)$. It is not meaningless to ask him to compare $H(A) - H(B)$ with $H(B) - H(C)$. He may say that $H(A) - H(B)$ is many times $H(B) - H(C)$ or vice versa or that they are roughly the same, or some similar judgement regarding their relative size, though he may not be able to give an exact multiple. This means that his happiness is cardinally measurable subject to some imprecision. If happiness were purely ordinal, he would dismiss such comparisons as meaningless.

The controversy of happiness or utility measurability is partly due to the fact that the same term "utility" is used to measure the subjective satisfaction or happiness of an individual (which is clearly cardinally measurable at the ratio-scale level) and also used to indicate the preference *rankings* of an individual (where only the orderings or ordinal utility is relevant). While the latter concept is relevant to the positive theory of consumer choice under certainty, the former is relevant for many other purposes. Investigators involved in the study of happiness may also include the cardinal measurability aspects of happiness. A study that reveals the ordinal aspects may be useful, but a study that also reveals the cardinal aspects is *more* useful.

Even ignoring utility as an objective indication of rankings or choice, cardinal measurability may be more or less apparent, depending on the exact definition of happiness adopted. For such an old and

common term like happiness, an old definition is a good definition. There is no reason to deviate from the old utilitarian definition such as one expressed by Sidgwick: "surplus of pleasure over pain; the two terms being used, with equally comprehensive meanings, to include respectively all kinds of agreeable and disagreeable feelings" (Sidgwick, 1981 edition, pp. 120–121). With such a definition, its cardinal measurability is obvious.

In contrast, consider the definition of happiness by Veenhoven (1984: pp. 22–24; emphasis original):

> Happiness is then: *the degree to which an individual judges the overall quality of his life-as-a-whole favourably.* ... One cannot say whether a person is happy or not if he is intellectually unable to construct an overall judgement. Thus the concept cannot be used for animals, little children and mentally retarded people. ... Thus defined, happiness appears as an *attitude towards one's own life.*

It is, however, misleading to use a common term like happiness with a well-known meaning. Obviously, little children can be happy and unhappy. The definition quoted above is thus not happiness as commonly understood. Nevertheless, even with such uncommon concept of happiness, it seems that it is still cardinally measurable. In Veenhoven's (1984, p. 22) own words, his concept of happiness "depicts a degree; like the concepts as 'length' or 'weight' it denotes more or less of something".

Estimating the Numbers of Just Perceivable Units of Happiness

Happiness is subjective. However, the measurement of happiness and other subjective attributes is usually made with respect to some physical stimuli (light, income, etc.). Three different methods of such psychophysical measurement may be distinguished.[1]

Poikilitic measurement

Poikilitic measurement composes the psychophysical function from the just noticeable differences of the stimulus variable. Each just noticeable difference is taken to give rise to equal differences in the sensation variable. The well-known Weber-Fechner law specifies the result: Sensation = k log Stimulus.

Magnitude measurement

Magnitude measurement composes the psychophysical function from numbers assigned by individuals "to a series of stimuli under

the instruction to make the numbers proportional to the apparent magnitudes of the sensations produced" (Stevens, 1957, p. 165). This method originated from the ratio production by Merkel (1888–9) who asked individuals to find the stimulus that appeared to double the sensation.

Categorical measurement

Categorical measurement composes the psychophysical function from the assignment of stimuli to a finite number of given categories.

> The subject is instructed to assign the 'smallest' (weakest, lightest, darkest, etc.) stimulus to the first category, the 'largest' to the mth category, and to use the other response categories so that his subjective impressions of the distances between successive categories is the same, that is, so that the categories are *equally spaced subjectively*. (Luce et al., 1963: p. 261)

For poikilitic measurement, the assumption of equal differences in sensation of just noticeable differences of the stimulus variable has been queried. The assumption may be reasonable for comparisons involving the same time scale and ignoring indirect effects. For example, my just noticeable difference of *House A* over *House B* is likely to be many times more in utility difference than my just noticeable difference of *Cup C* over *Cup D* of coffee, for the simple reason that I drink a cup of coffee in a few minutes but live in a house for years. However, for just noticeable differences involving the same time scale, this difficulty does not arise. It may be desirable to use a just noticeable duration of just noticeable difference in sensation as the unit of measurement.

Secondly, that an individual can tell a difference does not necessarily mean that he is better or worse off in terms of subjective sensation. I can tell the difference between many different shades of a colour on my fence, however, if I do not care which shade it is, there is no difference in my subjective well-being. Thus, if we are interested in measuring happiness, a just noticeable difference in the stimulus variable should only be regarded as occurring only if there is an associated change in the subjective sensation of well-being.

Another complication is the indirect effects of certain stimuli. A cup of coffee does not only produce sensation when I taste it, it may also affect my future welfare through its effect on my health. One may not only enjoy an opera at the time of the performance but also

later on when recalling the good music or in noting its contribution to one's ability to appreciate arts. When such indirect effects are taken into account, the correct measurement of changes in subjective well-being by poikilitic measurement becomes almost impossible in practice, unless the following suggested indirect measurement is used.

First, select some stimuli with easily measurable sensations and with few, if any, indirect effects. Things that are valued only for their direct sensations are used, e.g. ice-cream to someone who likes its taste but does not care about its nutritional and fattening effects. Alternatively, we may use two different types of ice-cream with almost identical indirect effects (e.g. same fat and cholesterol content) but different taste. The number of just noticeable duration of just noticeable differences (which may be called just perceivable unit of pleasure or happiness) may then be measured to a fairly high degree of accuracy by careful and repeated measurement.

Other less directly measurable differences in individual well-being may then be estimated by indirect measurement. Several methods of such indirect measurement may be possible. One is using magnitude measurement mentioned above. For example, if one would like to know how happy or unhappy a person is on a particular day or on an average day, he may be asked the following question: Write down a number representing the ratio of the amount of your happiness on that day to the amount of extra happiness you have in eating one serve (precise quantity as used in the measurement mentioned in the preceding paragraph) of Ice-cream A over Ice-cream B under condition *X*. Since we already know the amount of this extra amount of happiness in terms of just noticeable units of pleasure, we may then calculate his happiness on that day in the same terms by simple multiplication.

It is true that the measure so obtained may not be accurate since mistakes on the part of both the researcher and the subjects may occur in both the direct and indirect stages of measurement, but of course this is true to varying degrees for all types of measurement. Also, subject to this inaccuracy (which may be reduced over time as the method is gradually improved), the measure so obtained has the virtue of being fully cardinal and interpersonally comparable.

An alternative method of indirect measurement is to utilize the principle of expected utility maximization. Let x = the individual

current situation (when he is eating Ice-cream A), y = the same situation except that Ice-cream A is replaced by Ice-cream B for a particular meal, z = some other specified changes from x. Suppose the individual prefers x to y and prefers y to z. Let him choose between the certainty of y and the prospect of $(x, z; \alpha, 1\text{-}\alpha)$ where α is the probability of x and $1\text{-}\alpha$ that of z. Adjust the value of α until he is indifferent between the two. Ignoring the difference of less than a unit of just perceivable unit of pleasure, we have,

$$U(y) = \alpha U(x) + (1 - \alpha)U(z)$$

which gives, upon subtracting $U(x)$ from both sides and reversing sign,

$$U(x) - U(y) = (1 - \alpha)[U(x) - U(z)]$$

where $U(s)$ is the utility at situation s measured in terms of just perceivable units of happiness. Since we already know the value of $U(x) - U(y)$ from direct measurement, that for $U(x) - U(z)$ can be calculated by simple multiplication with $(1\text{-}\alpha)$.

It is true that, apparently, persistent violations of the expected utility hypothesis have been demonstrated (e.g. Allais and Hagen, 1979; Slovic and Lichtenstein, 1983; Tversky et al., 1990). However, most of these violations are not really violations in a more complete specification of the relevant outcomes including the effects of the pleasure of gambling, regret, etc. The remaining violations can be explained by mistakes in decision making. If all relevant effects have been taken into account, a rational decision maker facing uncertainty should be trying to maximize expected utility (Ng 1975, p. 559; 1984; 1985, pp. 455–7).

Thirdly, we may use individual willingness to pay or the amount of money necessary for full compensation as a means of comparison. Suppose our individual is at x which he prefers to both y and z. We may then determine the maximum amount of money ($\$g$) he is willing to pay[2] in order not to move to y, and the corresponding amount of money ($\$h$) he is willing to pay in order not to move to z (i.e. from the position x before paying $\$g$). If we ignore differences in preference of no more than a just perceivable level, we have the following equations.

$$U(x - \$g) = U(x) + \int_{\bar{M}}^{\bar{M}-\$g} MUMdM = U(y)$$

$$U(x - \$h) = U(x) + \int_{\bar{M}}^{\bar{M}-\$h} MUMdM = U(z)$$

where *MUM* is the marginal utility of money. Assuming *MUM* to be fairly constant, we can then infer that $\{U(x) - U(y)\}/\{U(x) - U(z)\} = g/h$.

A shortcoming of this method is that, if g and h differ significantly, it involves a margin of error that is due to the possible changing *MUM*. However, we can make this margin as small as we like, subject to practical difficulty, by selecting the alternatives such that the value of g is close to h. Nevertheless, this procedure assumes that the individual does not care about how the money he pays (receives) is used (raised). Relaxing this assumption, $(x - \$g)$ need not be taken as his original consumption minus $\$g$, but may be taken as the social state arrived at by the transferring of $\$g$ from him. In this general interpretation, the use to be made of the money transferred has to be specified since the well-being of the individual may be affected, then *MUM* may differ even if $g = h$, hence the use of the money transferred may have to be held constant as well.

Another possible shortcoming of the willingness-to-pay method of indirect measurement is that it works only if the individual concerned has no significant procedural preferences[3] with respect to money payment and compensation. Otherwise we have to estimate the amount due to such preferences and subtract them away before making the indirect comparison.

2. AN EXPLORATORY SURVEY TO MEASURE "JUST PERCEIVABLE INCREMENTS" OF HAPPINESS

Method

A questionnaire was constructed to obtain self-avowed amounts of happiness that have cardinal significance and interpersonal comparability by using "just perceivable increments" of happiness. Due to the rather elaborate nature of the questionnaire and the limited resources available, the exploratory survey is done only for forty-one graduate students in the 1993 Sino-American Economics Training Class in the People's University of China, Beijing. The students were, however, recruited from various universities all over China. The response rate was 100%. Anonymity in answering the questionnaire was stressed

and strictly enforced. Before the survey was undertaken, an hour or so of explanation was given to the students on the concepts of happiness measurement and the meaning of the various questions. While the maintenance of objectivity was attempted, I accept that the answers could have been affected by the explanations. It is thus interesting to compare results of similar questionnaires administered by other researchers.

Of the 39 students who revealed their ages, 31 were aged 21–35 and one aged 36–55. The other two who did not reveal their age should also be in the age group of 21–35. There were 14 females and 27 males. Most were doing their masters degrees in economics or economics related subjects. Thus, this is a rather homogeneous group, making inter-subgroup comparisons not very fruitful.

Since a substantial amount of time was needed to complete the questionnaire, after the explanation with question/answer session, the subjects were allowed to take the questionnaire to answer at their leisure. A small amount of monetary compensation (RMB$20 = US$2.50 per subject) was given for the time taken. Copies of the completed questionnaire were collected two days later.

The questionnaire was first set in English. It was translated into Chinese. The subjects, who were bilingual but much more proficient in Chinese, were given both versions but used the Chinese version. The English version was to help with clarification where the meaning was unclear. However, the Chinese version was well translated and caused no problem, as testified by the present writer who speaks and writes Chinese as his first language.

Results

Results from the survey are reported below, mainly the percentage distributions and standard deviations of the various questions. Some cross-question results are also reported. The questions and the results are reported together to save space.

Question 1 is a standard one used in happiness surveys. It is used here mainly for the purpose of comparison.

1. I describe myself over the last 12 months as (tick one of the following):

	Number	*%*
a. very happy	1	2.44
b. fairly happy	14	34.14
c. not too happy	21	51.22
d. not happy	5	12.20
Total	41	100.00

2. Reflecting over the last 12 months, I estimate that the total amount of positive happiness (all forms of well-being including pleasures of the flesh like eating, as well as feelings of mental fulfilment) I have experienced is approximately equal to

   ☐ times (indicate the number of times, e.g. 2.5; use a fraction, e.g. 0.6, if unhappiness exceeds happiness) the total amount of (physical and mental) unhappiness I have experienced over the same period (12 months).

   (*Answers average = 1.743; standard deviation = 1.507; number of respondents = 37*)

The following explanation was given in the questionnaire preceding Question 3.

> "*For a cup of coffee of given strength, size, etc., suppose you prefer, up to 2 spoons, more sugar to less. However, you may not be able to perceive any difference between say 1.8 and 1.7 spoons. Thus, by carefully varying the amount continuously, you can discover your "just perceivable increment" of sugar. Drinking a cup of coffee A with a just perceivably higher amount of sugar (but less than 2 spoons) than cup B would give you a level of utility (happiness) just perceivably higher.*
>
> *However, a just perceivable or noticeable difference may have different significance due to the following reasons. First, there may exist indirect and long-term effects. For example, sugar does not just yield utility by enhancing the taste of coffee, but may also be useful or harmful as a source of energy, etc. Secondly, different goods are consumed over different lengths of time. The effect of a just perceivable increment of sugar*

depends on whether you just take a sip of the coffee or drink the whole cup over a relaxing period of time.

Now let us define a unit of utility (or a util) as a just perceivable increment of subjective well-being (or happiness) over a just perceivable interval of time. When you are neither feeling happy nor unhappy, the level of your utility is zero. Thus, the curve representing the level of your utility over time may look something like Figure 1.

Define your net happiness over a period of time as the sum of the areas above the horizontal axis minus the sum of the areas below the horizontal axis. (Now please also read the example in Question 6 to help you understand the above method.)

After reading the above explanation carefully, please answer the following questions honestly to the best of your ability."

3. Do you think that the definition of net happiness given above corresponds:

	Number	*%*
a. exactly	27	65.85
b. closely	3	7.32
c. approximately	10	24.39
d. not at all	1	2.44
Total	41	100.00

with your own understanding of the expression "net happiness".

4. If you did not tick (a) above, could you explain briefly the difference of your understanding of "net happiness" with the definition above.

(*For answers, see subsection "Discussion" below.*)

5. Helping others may increase your own happiness, or the mere fact that others are happier may increase your own happiness. Thus, even if you are maximising your own happiness only, you may still help others, etc. Keeping this in mind, which of the following better describes your objective?

   a. "My aim in life is to maximise my net happiness";

   (*46.34% of respondents ticked [a]; 19/41*)

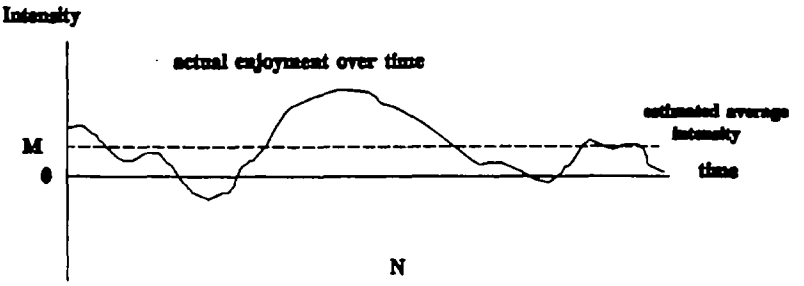
b. "While my own happiness is the main component of my objective, I am willing to help others even if this would result in a net reduction of my net happiness (even after taking into account the positive effect of helping others in increasing my happiness)";

(46.34% of respondents ticked [b]; 19/41)

c. "My objective is not mainly the pursuit of happiness, either my own or that of others, either directly or indirectly." (E.g. if you place great importance on certain apparently non-happiness principles, *because* these principles ultimately promote happiness, then this cannot be the reason for you to tick this answer.)

(7.32% of respondents ticked [c]; 3/41)

6. Consider something you moderately like to eat or drink (e.g. a cup of coffee, tea, an apple). Reflect on the amount of utility you derive from enjoying eating or drinking it, on average and for a standard serve, ignoring all indirect effects. Estimate the amount of this utility in terms of the number of utils (i.e. minimum perceivable increments of well-being). One way to estimate this is to estimate : (i) the length of time you enjoy it in terms of the number of just perceivable interval of time (say N); (i) the average intensity of your enjoyment over this interval of time in terms of the number of just perceivable intensity of enjoyment (say M), and then take the product of these two numbers.



For example, suppose you drink a standard cup of coffee over 50 seconds. Over this time period, you sometimes find it very enjoyable, sometimes only slightly so, sometimes not at all. Suppose the *average* intensity of enjoyment over the 50 seconds is a certain degree of "mildly enjoyable". This degree is equal to approximately two units of just perceivable intensity of enjoyment if halving its intensity would make you just able to perceive it as enjoyable. If the minimum length of time for you to be able to perceive this enjoyment is half a second, the total units of enjoyment (or total number of utils) for drinking the cup of coffee is $2 \times 100 = 200$ units. (But you should do your own estimate which needs not equal or even come close to 200 units.) Fill the following table with your answers.

Type of food or drink	*Your Answers*
Number of utils per standard serve on average (ignoring indirect effects)	*Average = 413.1 units of utils* *Standard deviation = 513.8112* *Number of respondents = 40*

7. Now estimate the amount of your positive happiness and negative happiness (i.e. unhappiness) over an average week over the last 12 months in terms of the number of times this happiness and unhappiness is equivalent to the happiness you derive from eating or drinking (one serve of) the something you mentioned in Question 6 (called "that item" in the table below). In estimating the happiness and unhappiness of an *average* week, take account of unusually happy/unhappy days as well as a normal week, i.e. the average is the average figure over the last 12 months.

	Your Answers
How many times is the amount of your positive happiness over an average week equal to the amount of happiness derived from taking one serve of that item on average (ignoring indirect effects)?	*Average = 653.4* *Number of respondents = 40*
How many times is the amount of your unhappiness over an average week equal to the amount of happiness derived from taking one serve of that item on average (ignoring indirect effects)?	*Average = 397.6* *Number of respondents = 40*

	Your Answers
How many times is the amount of your net happiness over an average week equal to the amount of happiness derived from taking one serve of that item on average (ignoring indirect effects)?	*Average = 244.6* *Number of respondents = 39*

8. Recalling your experience over the last 12 months, and classifying the sources of your positive happiness (negative happiness in the next question) into the following items, please indicate the amount of happiness from the various sources for an average week in terms of the number of utils per week (e.g. for something you do once every two weeks, divide the average number of utils each time by two to get the number of utils per week) and as a percentage of your total positive happiness over an average week. You may wish to estimate these indirectly by comparing them to the amount of happiness you derive from eating/drinking that something mentioned in the previous question. Try to include all feelings of happiness but avoid double counting (e.g. include opera music under "theatre going" but exclude it under "listening to music"). Read all items before answering so that you know what to include under which item. Use a pencil to answer this and the next questions as you may wish to readjust your answers.

Source of Positive Happiness	Number of Utils Per Week	% ot Total Positive Happiness
(a) Eating and drinking (including both alcoholic and non-alcoholic)	*average = 75,352.88*	*16.64*
(b) Sex	*average = 4,396.94*	*5.37*
(c) Sleeping (excluding sex), resting, idling	*average = 25,151.22*	*12.82*
(d) Reading	*average = 32,369.95*	*14.35*
(e) Watching TV	*average = 17,305.15*	*2.87*
(f) Listening to music (excluding theatres), singing and playing musical instruments	*average = 26,271.34*	*6.66*

Source of Positive Happiness	Number of Utils Per Week	% ot Total Positive Happiness
(g) Going out (excluding religious activities): (i) "indoor" activities (theatres, parties, etc.) (ii) "outdoor" activities (fishing, strolling, sports, including indoor sports, etc.)	*average = 9,782.75*	*7.16*
(h) Travelling/tourism (away from normal residence, including spending a day or more at holiday resorts or your own holiday house)	*average = 8,908.04*	*2.74*
(i) Working (including studying): (i) at work place (ii) at home	*average = 46,814.74*	*12.50*
(j) Conversation and other human inter-actions (excluding sex): (i) at work/study (ii) at home (iii) with friends/neighbours, etc.	*average = 15,142.76*	*11.92*
(k) Religious fulfilment: (i) while attending church functions (ii) while at home or elsewhere	*average = 106.92*	*0.14*
(l) Fulfilment from pets and other animals	*average = 413.33*	*0.66*
(m) Feelings of: (i) a sense of accomplishment or achievement not already included above (especially i, and k) (ii) other happy feelings not included above (please specify):	*average = 5,054.76*	*7.80*
(n) All other sources not included above (please list the major ones):	*average = 1,207.89*	*3.00*

Note that the figures reported in the last column are average figures of the percentage figures reported for the respective items and hence they may not add up to 100% and may differ substantially from the percentage figures calculated from the average figures for the number of utils in the middle column. This is also true for the following question.

9. Repeat your answers now for sources of unhappiness for an average week in the past 12 months. (If you think your headaches or stomach ulcers are due 80% to worries and 20% to your poor physical health, include 80% of the relevant pain under (b) and 20% under (a) below.)

Sources of Unhappiness	Number of Negative Utils Per Week	% of Total Unhappiness
(a) All forms of physical illness and aches due to physical injuries and deterioration	*average = 20,909.28*	*13.81*
(b) Illness, aches and other sufferings due to non-physical reasons	*average = 18,139.66*	*13.25*
(c) Quarrels, fights or other unhappy relationships with ——	*average = 8,471.11*	*10.88*
(i) spouse		
(ii) other family members		
(iii) other relatives		
(iv) friends		
(v) neighbours		
(vi) workmates/classmates (excluding boss)		
(vii) boss		
(viii) others		
(d) Disutility of commuting to and from work/study	*average = 10,974.53*	*5.96*
(e) Feelings (not already included above) of ——	*average = 22,543.88*	*29.27*
(i) loneliness		
(ii) anger, frustration		
(iii) envies		
(iv) guilt		
(v) stress		
(vi) other negative feelings (please specify):		
(f) Disutility of work (not included above) of	*average = 19,551.68*	*14.83*
(i) effort		
(ii) dullness		
(iii) others (please specify):		

Sources of Unhappiness	Number of Negative Utils Per Week	% of Total Unhappiness
(g) Discomfort of having to get up from sleep, from watching TV, etc.	*average = 4,590.61*	*4.20*
(h) Daily chores (please specify the ones you hate most):	*average = 8,558.68*	*7.86*
(i) All other sources of unhappiness not included above (please specify the major ones):	*average = 2,630.18*	*4.97*

10. Adding up your answers to Questions 8 and 9, the total amount of your positive happiness in the last 12 months is approximately equal to –

[*1.925*] times the total amount of unhappiness over the same period.

11. Comparing your answer to Question 10 to your answer to Question 2 (please do not change it), which one do you think is a more accurate answer?

[*19.51%*] a. Answer to Question 10 far more accurate than answer to Question 2.

[*29.27%*] b. Answer to Question 10 somewhat more accurate than answer to Question 2.

[*41.46%*] c. Not much different either way.

[*1.22%*] d. Answer to Question 2 somewhat more accurate than answer to Q. 8.

8.54% e. Answer to Question 2 far more accurate than answer to Q. 10.

12. Suppose either one of the following hypothetical changes actually did happen in the last 12 months, estimate the effect of each one (and one only at a time) respectively on *your* (do not include effects on others) net happiness in the last 12 months, both in terms of common expressions (choose one of the following for each item: GI for greatly increase, IS for increase somewhat, U for unchanged, DS for decrease somewhat, GD for greatly decrease) and in terms of estimated changes in utils for an average week (e.g. +5,000, −3,000). To estimate these figures, you may wish to compare your estimated changes in net happiness with your answers to Question 6.

Hypothetical Event	Effect on your net happiness (GI, IS, U, DS, or GD)	Effects (per week) in terms of utils (give an approximate number, e.g. +4,500 or −2,000 for each item; make sure to include the plus or minus sign)
(a) 20% increase in the real value (freedom to spend on any good and service) of consumption (in comparison to the actual consumption in the last 12 months)		
(i) for yourself only	(i) GI = 51.28% IS = 48.72%	(i) 30,028.72
(i) for all members of your household only	(ii) GI = 71.05% IS = 28.95%	(ii) 42,971.41
(iii) for all people in China only	(iii) GI = 26.32% IS = 50% U = 23.68%	(iii) 32,879.94
(iv) for all people in the world	(iv) GI = 21.05% IS = 28.95% U = 50%	(iv) 22,361.42

Hypothetical Event	Effect on your net happiness (GI, IS, U, DS, or GD)	Effects (per week) in terms of utils (give an approximate number, e.g. +4,500 or −2,000 for each item; make sure to include the plus or minus sign)
(b) 20% *decrease* in real consumption		
(i) for yourself only	(i) DS = 33.33% GD = 66.67%	(i) −24,015.77
(i) for all members of your household only	(ii) DS = 20.51% GD = 79.49%	(ii) −37,071.41
(iii) for all people in China only	(iii) GD = 35.9% DS = 53.85% U = 10.25%	(iii) −50,949.18
(iv) for all people in the world	(iv) GD = 23.08% DS = 38.46% U = 38.46%	(iv) −51,297.05
(c) A big (but not inconceivable improvement in your personal relationship with one person (choose one that gives the greatest positive effect on your net welfare in the last 12 months; please specify: –)	GI = 58.33% IS = 41.67%	787,204.60
(d) A big (but not inconceivable) deterioration in your personal relationship with one person (choose one that gives the greatest negative effect on your net welfare in the last 12 months; please specify: –)	GD = 61.11% DS = 36.11% U = 2.78%	−119,461.30
(e) 20% reduction in your physical illness and aches	GI = 70.3% IS = 27% U = 2.7%	48,088.46
(f) 20% reduction in your mental worries	GI = 86.5% IS = 13.5%	48.919.86

If you have no objection, please circle the following.

Sex:	F (*34.15%; 14/41*)	M (*65.85%; 27/41*)		
Age:	under 21	21–35 (*97.44%; 38/39*)	36–55 (*2.56%; 1/39*)	over 55
Occupation:	student	farmer	factory worker	office job
	(*95%; 38/40*)			
	professional	own business	housewife	retired
	(*5%; 2/40*)			
	unemployed			

Marital/relationship status:

Single with a partner	(*15.79%; 6/38*)
Single without a partner	(*73.68%; 28/38*)
Married	(*7.9%; 3/38*)
Divorced with a partner	
Divorced without a partner	(*2.63%; 1/38*)

Discussion

The concept of happiness defined in Question 2 may be regarded as too narrow and purely hedonic. However, issues such as indirect effects (e.g. on future happiness) and external effects (on other people) must be dealt with separately. (See also my distinction between non-ultimate considerations versus basic values discussed in Ng 1990.) Moreover, most respondents agreed with the definition of happiness adopted.

It is remarkable that two thirds (2/3) of the respondents think that the definition of net happiness given corresponds exactly to their own understanding of the expression, and only one respondent thinks it does not correspond at all, as reported in Question 3 above. Out of the 14 respondents who did not tick "exactly" (corresponds), 12 answered Question 4. The following answers are roughly representative. "I don't usually have such accurate imagination regarding net happiness." "Net happiness should only be the amount of positive happiness. Happiness and pain/suffering are two separate things, not summable" (This is the only respondent who ticked "not at all" to Question 3.) "I think that subjective feelings are impossible to quantify so accurately." "My feeling with respect to time is not like a

clock; one minute means one minute. Rather, sometimes my feeling is sensitive, sometimes dull. So different weights should be used for different times. Otherwise, my understanding of happiness is the same as yours." (This subject has a good point. To account for this, the horizontal axis in Figure 1 has to be defined also by units of just noticeable time intervals.) "Blessing in disguise; how do you judge." (Obviously, this respondent missed the point of ignoring indirect and long-term effects.) "If net happiness sums to zero over a period of time but the degree of happiness has been increasing over that period, I usually regard happiness as positive, and vice versa. I emphasize the feeling of the later part (than the earlier part). So perhaps some weighting should be used." What this respondent said may be quite true for many people. But I think this is their mistake of "imperfect memory", something like myopia in the direction of the past.

A most remarkable feature is discovered by comparing the answers to Question 1 and Question 2. As reported above, while the majority of the respondents (26 out of 41) ticked either "not too happy" or "not happy" in answering Question 1, the average answer to Question 2 is a figure (1.743) substantially *higher* than one, instead of lower. Looking at the individual answers, only 12 respondents gave figures less than one. (The lowest being 0.1, reported by two respondents.) They are all those who ticked either "not too happy" or "not happy". However, another 11 of such respondents gave figures in excess of one. In fact, two gave the figure "2", one gave 1.8, and four gave 1.5. But all those who ticked "very happy" or "fairly happy" gave figures in excess of one. Moreover, there is clearly a strong positive correlation between the answers to Question 1 and Question 2. Possibly, many respondents had higher expectation and regarded the proportion of happiness to unhappiness of 1.5 to 2 as somewhat below expectation and regarded themselves as being "not too happy". But this could also be due to the ambiguous term "not too happy" which could be interpreted to mean a small amount of either positive or negative happiness. As argued at the beginning of Section 1 above, such ambiguous terminology should be avoided.

The high level of agreement to the aim in life being the maximization of one's net happiness as reported in Question 5 is remarkable. Apart from deeply religious persons, those who regarded otherwise

probably committed the mistake of confusing non-ultimate considerations with basic values, as argued in Ng (1990).

Despite the obvious difficulties in completing Questions 7–9, most respondents completed most boxes. Moreover, most respondents gave mutually consistent answers within a question and between questions. The very low percentage of positive happiness accounted for by sex (5.37%, Part (b) of Question 7) is explained by the fact that 73.7% of the respondents were single without a partner. For the three who were married, the percentages of positive happiness accounted for by sex were 5%, 10%, and 68%. For the six who ticked "single with a partner", two answered "zero" for the amount of happiness from sex. Presumably, the relationships were platonic. In China, it is very common for boy-girl relationship to remain platonic for a long time. The figures for sex for the other four with a partner were 0.7%, 8.9%, 12.4%, and 50%.

After going through the detailed account of happiness and unhappiness in Questions 8 and 9, most respondents gave a somewhat higher happiness/unhappiness ratio in Question 10 than in Question 2. The average ratio increased from 1.743 to 1.925. Out of the 37 respondents who answered both questions, 20 gave higher ratios for Question 10 (than Question 2), 12 gave lower ratios, five gave the same ratios. Except two or three respondents, the ratios for Question 2 and Question 10 were fairly close to each other (for the same respondent). The detailed figures are reported in Table A.

As reported in Question 11, nearly half (48.78%) of the respondents believed that their answer to Question 10 was more accurate than that to Question 2. Another 41.46% thought they were not much different, and only 9.76% thought that their answer to Question 2 was more accurate. If this is acceptable, our method also provides a more accurate method for obtaining happiness information.

The answers to Parts (a) and (b) of Question 12 probably suggest that, for most respondents, there is a strong empathy effects for family members and also a strong relative-income effects vis-a-vis other people. Comparing the answers to Parts (c)–(f) of Question 2 to Parts (a) and (b) of the same question and Questions 8 and 9, one may infer that the respondents placed very high values on personal relationships relative to material consumption. This is true even if we take away an extreme outlier (who gave a value of 30 000 000 in

TABLE A
Gender, companionship and happiness

Companionship status	(Average ratio of happiness/unhappiness; standard deviation in brackets)	
	Gender	
	Female	*Male*
Single and without a partner	1.8643 (1.5424) (n = 7)	1.5526 (1.0115) (n = 22)
Married or with a partner	2.7367 (1.6531) (n = 3)	3.2040 (2.5114) (n = 6)
Total*	1.9633 (1.4513) (n = 12)	1.9097 (1.5340) (n = 29)

* Each of the two figures for all females and all males include one or two respondents not included either under "single" or "married or with a partner" due to non-revelation.

answer to Part (c) of Question 12 for falling in love) and thus reduce the average value of answers to Part (c) from 787 204.6 to 38 158.6.

Table A reports the answers to Question 10 classified according to gender and companionship. Consistent with other happiness surveys, companionship (defined as being married or having a partner) is very significantly related positively to happiness. Also consistent with other surveys, this positive effect of companionship is more pronounced for males than for females. However, if not sub-classified in accordance to companionship, there is no significant difference in happiness/unhappiness ratio between females and males.

3. CONCLUDING REMARKS

The survey reported in Section 2 based on the concept of just perceivable increments of pleasure or pain shows that, despite difficulties, happiness questionnaires could be designed in a way that allow the identification of interpersonally comparable and cardinally measur-

able amounts of happiness and unhappiness. However, since this is only an initial attempt at this difficult measure by someone not too well qualified, many problems no doubt remain. For example, one could argue that a ratio-scale measure of happiness should meet standard tests of reliability and validity (such as the convergent validity test of broad agreement with a well validated ordinal scale measure). The validity of interpersonal comparability also needs further examination. This paper is certainly not meant to be conclusive on these issues. Nevertheless, the relative success of the present attempt may hopefully serve as a brick to attract jades, as the Chinese put it.

NOTES

[1] See, e.g. Luce, Bush and Galanter (1963, chapters on discrimination and psychophysical scaling), Stevens (1957), Wegener (1982). In the text, I have followed the brief summary of Seidl (1988).

[2] If y and z are preferred to x, we have to find out the amount of money he has to be paid.

[3] On procedural preferences, see Ng (1988) which also argues that they are largely due to the ignorance of economics.

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