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Well-Being

Happiness: Revising Set-Point Theory and Dynamic Equilibrium Theory to Account for Long Term Change

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Abstract

An adequate theory of happiness or subjective well-being (SWB) needs to link at least three sets of variables: stable person characteristics, life events and measures of well-being (life satisfaction, positive affects) and ill-being (anxiety, depression, negative affects). By including personality measures in the 2005 survey, SOEP becomes the first available dataset to provide long term evidence about personality, life events and change in one key measure of SWB, namely life satisfaction. Using these data, the paper suggests a major revision to the set-point or dynamic equilibrium theory of SWB in order to account for long term change.

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1. Introduction

A dynamic equilibrium (DE) theory of subjective well-being (SWB) was initially proposed to account for linkages between personality, life events, well-being and ill-being (Headey / Wearing, 1989). Prior to that, Brickman and Campbell (1971) had shown that people usually return to a baseline – or equilibrium level, or set-point – of happiness following both favourable and adverse major life events. DE theory is now usually labelled set-point theory.

DE theory and set-point theory have been extended in two main ways in recent years. Evidence has been adduced about additional stabilizing factors which tend to keep people close to their happiness / SWB set-point. Headey and Wearing (1989) attributed long term stability to the stable traits of extraversion (E) and neuroticism (N). Lykken and Tellegen (1996), using the Minnesota Twin Study, showed that heredity generally (and not just E and N which are substantially heritable), is a powerful influence on lifetime SWB. Other researchers have investigated the effects of life events which can cause medium term and perhaps permanent change in set-points. These events in-

clude the unexpected death of a child (Wortman / Silver, 1987), repeated spells of unemployment which have a 'scarring effect' (Clark et al., 2004), becoming widowed and perhaps getting married (Lucas et al., 2003).

DE theory and set-point theory remain controversial partly because the two lines of research just described pull in different directions, although they are not necessarily contradictory. The first elucidates set-point stabilizers, while the second directs attention to destabilizers. Clearly, if it were common for destabilizers to overwhelm stabilizers, then dynamic equilibrium / set-point theory would not hold. The theory depends on finding that most people, most of the time, have stable levels of SWB. Some recent papers, using SOEP data, have noted long term changes in SWB but have stopped short of concluding that DE / set-point theory requires revision (Lucas et al., 2003; Clark et al., 2004; Fujita / Diener, 2005).

The purpose of this paper is to revise set-point and DE theory. The main outcomes are: (1) clear evidence that set-point and DE theory require revision; evidence centered on finding that the stability of life satisfaction diminishes slowly over time and (2) analysis showing that the people who are most likely to record large changes in life satisfaction are those who score high on the personality traits of extraversion (E) or neuroticism (N), and also high on openness to experience (O). These people in a sense 'roll the dice' more often than others and so have a higher than average probability of recording long term changes in life satisfaction.

2. DE Theory / Set-Point Theory Reformulated

DE theory was initially put forward to account for two observations in the Australian (VQOL) Panel Survey. The first had been made before (Brickman / Campbell, 1971), the second seemed somewhat new and unexpected.

1. *Some people were persistently happier than others.* To be more precise, some respondents rated consistently higher on measures of WB than others, and some rated consistently higher on measures of IB. Measures of WB and IB were only moderately negatively correlated, so as well as observing individuals who were high on WB and low on IB, and vice-versa, we also found people who were high on both WB and IB, and a fourth group who were low on both WB and IB.
2. *The same life events and experiences kept happening to the same people.* This was a key surprise result in the Australian panel. It provided the clue that more or less fixed person characteristics, life events, WB and IB must be linked in some sort of 'dynamic equilibrium'.

3. DE Theory: Main Propositions

DE theory accounts for these observations, using the following building blocks: personality (N, E and O), life events (positive and negative), anticipatory and adaptive mechanisms invoked by life events, and WB and IB. These building blocks are linked in five sets of propositions, which were tested and appeared to be supported by data from less long term panels than SOEP now provides (Headey / Wearing, 1989; Magnus et al., 1993). The propositions are set out below and not further tested. They are not uncontroversial but, for the purposes of this paper, they will be taken as reflecting the state of play prior to the availability of the SOEP 1985 – 2005 data.

Proposition 1: Each person has his / her own stable equilibrium levels (or set-points) of WB and IB.

Proposition 2: Levels of WB and IB depend partly on E and N. People who rate high on E and low on N have high levels of WB and low levels of IB. People who score low on E and high on N rate low on WB and high on IB. People who score high on both E and N also score high on both WB and IB. People who rate low on both E and N score low on both WB and IB.

Proposition 3.1: Each person has a tendency to display repeating patterns of life events and experiences. Positive (favourable) events 'scores' (i.e. frequency of experiencing positive events) are correlated over time, as are negative (adverse) events 'scores'.

Proposition 3.2: Positive and negative events are also correlated over time. That is, the more positive events a person experiences, the more negative events he / she is also likely to experience (see Proposition 4.3 below for explanation of this apparently counter-intuitive proposition).

Proposition 4: The repeating patterns of events which people experience are driven by three personality traits – N, E, O – and stage of the life cycle.

H4.1 People who experience many positive events and few negative events score high on E, low on N, high on O and are relatively young.

H4.2 People who experience few positive events and many negative events score low on E, high on N, high on O and are relatively young.

H4.3 People who experience many positive and many negative events score high on E, high on N, and high on O and are relatively young.

H4.4 People who experience few positive and few negative events score low on E, low on N, low on O, and are relatively old.

Proposition 5.1: To the extent that, in any given time period, a person just repeats the pattern of positive and negative life events that is normal (mean level) for him / her, then WB and IB will remain at or revert to their set-points.

Proposition 5.2: To the extent that, in a given time period, a person deviates from his/her own normal pattern of events (i.e. relatively exogenous events happen), then WB and/or IB will deviate from their set-points.

4. Methods

4.1 Sample: SOEP (West German Data only)

The West German segment of the SOEP panel is the longest-running panel in the world to collect data on WB (life satisfaction). It began in 1984 with a sample of 12,541 respondents. The main sample has also been boosted by the addition of new immigrant samples, a special sample of the rich, and recruitment of new respondents partly to increase numbers in 'policy groups'. The data used in this paper relate to the 2843 respondents who reported their level of life satisfaction every year from 1985 onwards and then also provided personality data in 2005.

4.2 Measures

The dependent variable used here is a single item; a 0 – 10 scale of life satisfaction. Clearly, single item scales are not the most valid measures of WB available, but they have been reviewed as having reasonably adequate reliability and validity (Diener et al., 1999).

The SOEP introduced an extensive set of personality measures for the first time in 2005 (Gerlitz/Schupp, 2005). The main focus was on the so-called 'Big Five' personality domains. These are NEO-AC: neuroticism, extraversion, openness, agreeableness and conscientiousness. There is a semi-consensus among personality psychologists that these five domains (or traits) capture most of what we need to know about 'normal' personality. Gerlitz and Schupp (2005) report that the short scales included in SOEP do an adequate job of replicating the well validated longer scales. In this paper it was found that one of the extraversion (E) items ('reserviert') did not covary in the expected way with life satisfaction, so it was dropped in the analyses reported below.

In this paper personality is treated *as if* it is completely stable. This assumption is not completely true; personality can be modified by surgery, trauma, major life events and perhaps psychiatric counseling. However, for this paper, we need to assume that traits are stable and influence life satisfaction. So, in a sense, we treat the traits as if they were measured in the first not the latest wave of SOEP.

5. Results

5.1 Evidence that DE Theory and Set-Point Theory Require some Revision

The first issue is how to assess whether long term life satisfaction is completely stable, despite transitory fluctuations, or whether some people's set-points or equilibrium levels appear permanently to change. In tackling this issue, we will divide the 20 annual measures of life satisfaction into four five-year blocks: 1985 – 89, 1990 – 94, 1995 – 99 and 2000 – 04. By taking five-year averages we avoid being at the mercy of annual fluctuations in satisfaction and we get a clearer sense of how many people are recording substantial and potentially longer term changes (Fujita / Diener, 2005).

In the event 5.5% (N = 172) of respondents recorded an upward change of two or more points on the 0 – 10 life satisfaction scale between 1985 – 89 and 2000 – 04. 11.4 % (N = 357) recorded a change of two or more points downwards. A shift of this magnitude must be regarded as substantial. It is just under 1.5 standard deviations, which means that those respondents whose life satisfaction increased 'overtook' almost 50 % of their fellow respondents, whereas those who became less satisfied fell behind about 50 % of the sample.

Aside from individuals who recorded large changes in life satisfaction, the SOEP data provide two further pieces of evidence which indicate that set-point theory and dynamic equilibrium theory are in need of revision. Table 1 shows the over-time correlations of life satisfaction in the four five-year periods, and Table 2 shows the relationship between the personality traits E and N measured in 2005 and life satisfaction in earlier periods. If set-point theory and dynamic equilibrium theory were correct in the most literal and exact sense, there would be no diminution over time in correlations among life satisfaction measures, or between personality traits and life satisfaction.

Table 1

Diminishing Over-time Correlations: Life Satisfaction Measures[a)]

$LS_{1985-89}$	1.00			
$LS_{1990-94}$	0.67	1.00		
$LS_{1995-99}$	0.55	0.72	1.00	
$LS_{2000-04}$	0.48	0.59	0.74	1.00

a) Pearson correlations.

Table 2

Diminishing Over-time Correlations: Personality Traits and Life Satisfaction[a)]

	$LS_{2000-04}$	$LS_{1995-99}$	$LS_{1990-94}$	$LS_{1985-89}$
$Extraversion_{2005}$	0.16	0.14	0.13	0.10
$Neuroticism_{2005}$	–0.28	–0.23	–0.21	–0.17

a) Pearson correlations.

The evidence here is quite unambiguous. Previous shorter term data had shown little or no apparent diminution in correlations over time (e.g. Costa / McCrae, 1980; Headey / Wearing, 1989). But the longer term SOEP dataset shows that correlations among life satisfaction measures steadily diminish over time, as do correlations between life satisfaction and traits E and N. The second result is particularly interesting, but needs replication and checking with repeated measures of personality. It appears to mean that, even though E and N are known to be stable over long periods (Costa / McCrae / Zonderman, 1987), they do not always hold life satisfaction close to equilibrium.

6. Revising DE and Set-Point Theory

The next step is to try and revise DE and set-point theory to account for finding that, while most people's life satisfaction is stable, significant minorities register long term change. The following hypotheses are offered as modifications and extensions of the propositions listed earlier.

Hypothesis 1: Even in the long term, the large majority of people do not deviate much from their own equilibrium level or set-point for LS. They are particularly unlikely to deviate if they score near the mean or below on E, N and O.

Hypothesis 2: High levels of E and O, combined with low N, are associated with high 'upside risk' of favourable life events and substantial gains in long term LS.

Hypothesis 3: High N and O, combined with low E, are associated with high 'downside risk' of adverse life events and substantial decline in long term LS.

Hypothesis 4: High E, high N and high O increase both upside and downside risk of major life events and long term change in LS.

Hypothesis 1 says that the large majority of people, who score near the mean or below it on traits E, N and O, are unlikely to deviate much from their equilibrium level of life satisfaction. But there are three 'types' of people who 'roll the dice' more often than others and so have a higher probability than average of long term change in LS. Hypothesis 2 relates to people who rate

high on E and O, and low on N. They generally score high on life satisfaction, but their extraversion and openness to experience mean that they roll the dice a lot. They induce and experience many favourable events. Usually, these events will be 'normal' for them (endogenously driven) and their LS will not change. However, there is a moderate upside risk that a more or less exogenous favourable event will occur and produce a long term gain in LS. Hypothesis 3 relates to unhappy people who rate high on N and O, and low on E. Their neuroticism and openness mean that they experience many adverse events. They are at high 'downside risk' of a long term loss of life satisfaction. Finally, hypothesis 4 says that people who are high scorers on all three personality traits run high upside and high downside risks and may show either big long term gains or big losses in LS.

In making preliminary tests of these hypotheses, using the SOEP data, we can only look at linkages between personality traits and long term LS outcomes. SOEP does not yet provide adequate life events data, so evidence about the kinds of life events that repeatedly happen to different 'types' of people has to be taken on trust from previous research using shorter term panels (Headey / Wearing, 1989; Magnus et al., 1993).

Table 3 gives the key results. The dependent variable is our measure of long term change in life satisfaction, namely $LS_{2000-04}$ minus $LS_{1985-89}$. On the right hand side are the personality traits E, N and O. Gender, age and age squared are included as 'controls'. $LS_{1985-89}$ is also included on the right hand side, since it is correlated quite strongly with the long term change measure. Ordinary least squares regression (OLS) is used.

Table 3

Upside and Downside Risk of Long Term Change in Life Satisfaction: OLS regression

	Dependent variable: $LS_{2000-04} - LS_{1985-89}$
Extraversion	**0.11*** **
Neuroticism	**–0.24*** **
Openness	**0.06** **
Female	0.03
Age	0.01
Age^2	–0.00
$LS_{1985-89}$	–0.54***
R^2	28.7%
N	2843

*** significant at 0.001 ** significant at 0.01.

The evidence is in line with the interpretation that the more extraverted and open to experience a person is, the higher the probability of a gain in long term LS. Conversely, the more neurotic and open to experience a person is, the greater is his / her downside risk of a decline in long term LS. Overall, neuroticism appears to have the greatest effect in predisposing a person to long term change. Extraversion has a moderate effect, while, on this evidence, the effect of openness is small, although statistically significant at the 0.01 level.

Table 4 addresses a related but somewhat different issue. The idea that some people 'roll the dice' more than others, implies that the high rollers will display greater fluctuations in LS over time than those whose approach to life is more cautious. Table 4 reports results from a panel regression random effects model in which the dependent variable is LS in the four five-year periods. So the coefficients can be interpreted as the effect of the variable in question on *change* (or fluctuations) in LS from period to period.

Table 4

Upside and Downside Risk of Changes in Life Satisfaction in the Periods 1985 – 89, 1990 – 94, 1995 – 99 and 2000 – 04: Panel Regression Random Effects Model

	Dependent variable: LS in four five-year periods
Extraversion	**0.10*** **
Neuroticism	**–0.26*** **
Openness	**0.03***
Female	0.07
Age	–0.03***
Age^2	0.00***
R^2	9.5%
N	13925

*** significant at 0.001 * significant at 0.05.

The results here confirm that the LS of people who are more extraverted, more neurotic and more open to experience fluctuates more than is the case for people who rate low on these traits.

7. Discussion – *Possible Future Developments*

If DE theory and set-point theory have value, it will be important to try and keep improving their scope and specification, so they do a better job of accounting for change. This paper has only made a start in accounting for medium to long term changes in SWB. It may be that in order to understand such changes, we need to conceive of slow changes in personality accompanied by slow changes in individuals' patterns of life events. Such changes might best be modeled using moving average specifications. Such models, sometimes labeled ARMA models, are available, but they would require better quality long term data than we have at present. Inclusion of personality measures and reasonably detailed life events inventories in existing national panel studies are one way forward. It would also be ideal if the self-report measures of SWB in these surveys could be supplemented by high quality 'on line' data.

References

Brickman, P. D. / *Campbell,* D. T. (1971): Hedonic relativism and planning the good society, in: M. H. Appleby (ed.), Adaptation-Level Theory, New York.

Clark, A. E. / *Georgellis,* Y. / *Lucas,* R. E. / *Diener,* E. (2004): Unemployment alters the set-point for life satisfaction, Psychological Science 15, 8 – 13.

Costa, P. T. / *McCrae,* R. R. (1980): Influences of extraversion and neuroticism on subjective well-being, Journal of Personality and Social Psychology 38, 668 – 78.

Costa, P. T. / *McCrae,* R. R. / *Zonderman,* A. B. (1987): Environmental and dispositional influences on well-being. Longitudinal follow-up of an American national sample, British Journal of Psychology 78, 299 – 306.

Diener, E. / *Suh,* E M. / *Lucas,* R. E. / *Smith,* H. L. (1999): Subjective well-being: Three decades of progress, Psychological Bulletin 25, 276 – 302.

Fujita, F. / *Diener*, E. (2005): Life satisfaction set-point: Stability and change, Journal of Personality and Social Psychology 88, 158 – 64.

Gerlitz, J.-Y. / *Schupp,* J. (2005): Zur Erhebung der Big-Five-basierten Persoenlichkeitsmerkmale im SOEP, see: http: // www.diw.de / deutsche / produkte / publikationen / researchnotes / docs / papers / rn4.pdf.

Headey, B. W. / *Wearing,* A. J. (1989): Personality, life events and subjective well-being: Toward a dynamic equilibrium model, Journal of Personality and Social Psychology 57, 731 – 39.

Lucas, R. E. / *Clark,* A. E. / *Georgellis,* Y. / *Diener,* E. (2003): Reexamining adaptation and the set-point model of happiness: Reactions to change in marital status, Journal of Personality and Social Psychology 84, 527 – 39.

Lykken, D. / *Tellegen,* A. (1996): Happiness is a stochastic phenomenon, Psychological Science 7, 186 – 89.

Magnus, K. / *Diener,* E. / *Fujita,* F. / *Pavot,* W. (1993): Extraversion and neuroticism as predictors of objective life events: A longitudinal analysis, Journal of Personality and Social Psychology 65, 1046 – 53.

Selye, H. (1950): The Physiology and Pathology of Exposure to Stress, Montreal.

Wortman, C. B. / *Silver,* R. C. (1987): Coping with Irrevocable Loss, in: G. R. Vandenbos / B. K. Bryant (eds.), Cataclysms, Crises, Catastrophes: Psychology in Action, Washington, D.C.