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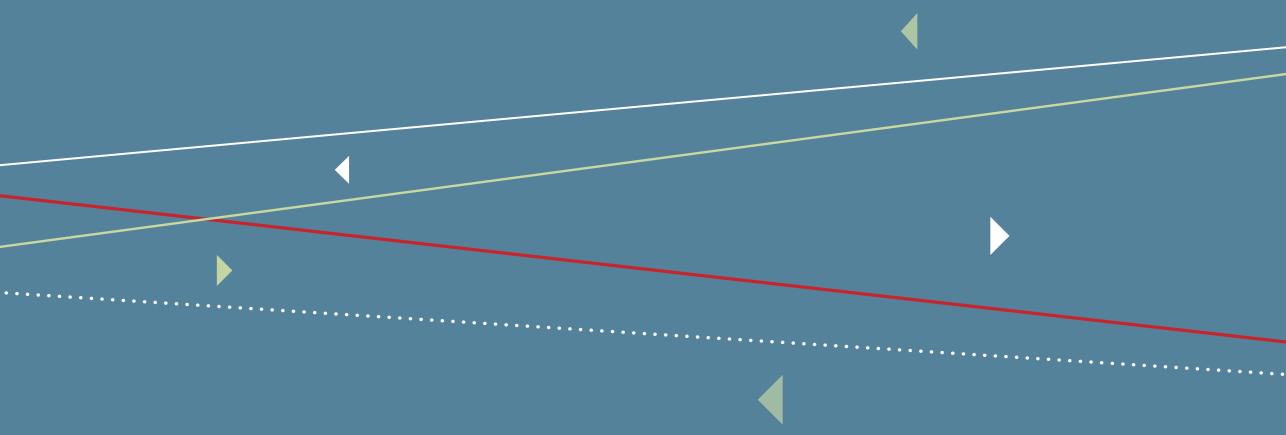
Anna Südkamp und Olaf Köller (Hrsg.)

Im Blickpunkt pädagogisch-psychologischer Forschung

Selbstbezogene Kognitionen, sprachliche Kompetenzen und Professionalisierung von Lehrkräften

FESTSCHRIFT FÜR JENS MÖLLER



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Prof. Dr. Jens Möller

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Vorwort

Das vorliegende Buch haben wir anlässlich des 60. Geburtstags von Jens Möller am 10. November 2017 zusammengestellt. Daher möchten wir mit einigen Anmerkungen zu seiner Person beginnen.

Jens Möller begann seine akademische Laufbahn 1978 mit dem Studium der Psychologie an der Christian-Albrechts-Universität zu Kiel (CAU). Im Anschluss war er ab 1986 in verschiedenen Funktionen eben dort am Institut für Psychologie tätig. In dieser Zeit wurde er 1991 mit einer Arbeit zum Thema „Attributionen in Massenmedien: Zum Einfluss nationaler Gruppenzugehörigkeit, Gruppengröße und Geschlecht auf spontane Ursachenzuschreibungen" promoviert, bevor er sich 1996 habilitierte. Die Habilitationsschrift trug den Titel „Auslösende Bedingungen leistungsbezogener Attributionen. Paradigma – Forschungsstand – empirische Studien." Im Jahr 1999 folgte er einem Ruf der Universität Bielefeld, wo er bis 2003 eine Professur für Psychologie in der Arbeitseinheit Lernen und Kognition inne hatte. Von dort kehrte er nach Kiel zurück, wo er seit 2003 Leiter der Arbeitseinheit Psychologie für Pädagogen ist. Seine Professur war bis 2016 am Institut für Psychologie verortet. Seit Januar 2017 befindet sich seine Arbeitseinheit an dem von Jens Möller mitgegründeten Institut für Pädagogisch-Psychologische Lehr- und Lernforschung. Zu den Meilensteinen seiner akademischen Tätigkeiten gehören seine zweijährige Funktion als Sprecher der Fachgruppe Pädagogische Psychologie in der Deutschen Gesellschaft für Psychologie (DGPs) und der Vorsitz der DGPs-Kommission Psychologie in den Lehramtsstudiengängen (2006 bis 2010). Zudem war er für drei Jahre bis 2010 geschäftsführender Herausgeber der Zeitschrift für Pädagogische Psychologie und Mitglied im Editorial Board renommierter Fachzeitschriften wie dem Journal of Educational Psychology (2007 bis 2009) oder dem Review of Educational Research (2014 bis 2016). Schließlich ist er seit 2012 Mitglied des Fachkollegiums Psychologie der Deutschen Forschungsgemeinschaft und seit 2014 externer Gutachter des Senatsausschusses Wettbewerb der Leibniz-Gemeinschaft.

Neben diesen Tätigkeiten liegt Jens Möller die Förderung junger Wissenschaftlerinnen und Wissenschaftler besonders am Herzen. So bietet er seinen Mitarbeiterinnen und Mitarbeitern nicht nur den notwendigen Raum für die eigenständige Entwicklung von Forschungsideen, sondern steht ihnen auch mit seiner fachlichen Expertise zur Seite und hat bei Fragen rund um die Wissenschaft und manchmal auch darüber hinaus eine offene Tür und ein offenes Ohr. Auch Nachwuchswissenschaftlerinnen und Nachwuchswissenschaftler außerhalb seiner Abteilung profitieren von seinem Fachwissen, etwa auf Konferenzen, in Workshops oder durch Mentorenschaften. Nicht nur der Nachwuchs, auch fortgeschrittene Wissenschaftlerinnen und Wissenschaftler national wie international kooperieren gern und häufig auch über die Grenzen verschiedener Disziplinen hinweg mit Jens Möller. Schließlich ist es ihm neben seinem Engagement in der Forschung auch ein Anliegen, dass die Erkenntnisse pädagogisch-psychologischer Forschung zur Anwendung kommen. Hier sind seine Kooperationen mit dem Institut für Qualitätsentwicklung an Schulen Schleswig-Hol-

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stein und sein nachhaltiges Interesse an der Ausbildung künftiger Lehrerinnen und Lehrer hervorzuheben. Beispielhaft für beides seien der Master-Weiterbildungsstudiengang „Schulmanagement und Qualitätsentwicklung", den er mitgegründet hat und zu dessen Leitungsteam er gehört, sowie seine langjährige Beteiligung an der schleswig-holsteinischen Sommeruniversität für Lehrkräfte genannt.

In seiner Forschung widmete und widmet Jens Möller sich einer breiten Palette an Themen, die sich in zahlreichen qualitativ hochwertigen Publikationen sowie der Einwerbung von Fördergeldern renommierter Drittmittelgeber niederschlägt (z. B. Deutsche Forschungsgemeinschaft, Bundesministerium für Bildung und Forschung, Stiftung Mercator). Für die vorliegende Festschrift haben wir aus dieser Vielfalt drei inhaltliche Bereiche herausgegriffen, die unserer Meinung nach die aktuelle Forschung von Jens Möller gut repräsentieren: Selbstbezogene Kognitionen, sprachliche Kompetenzen und die Professionalisierung von Lehrkräften. Zu jedem dieser Forschungsfelder haben wir Arbeiten aktueller und früherer Weggefährtinnen und Weggefährten von Jens Möller zusammengetragen. Manchen von ihnen hat er als studentischen Mitarbeiterinnen und Mitarbeitern oder in der Promotionszeit die Tür zur Wissenschaft geöffnet, andere hat er kollegial begleitet. Jens Möllers überaus freundliche und konstruktiv-unterstützende Art hat sich auch bei der Erstellung dieser Festschrift widergespiegelt. So haben alle Autorinnen und Autoren ihre Beteiligung ohne großes Zögern zugesagt und die Fertigstellung ihrer Beiträge mit hohem Engagement verfolgt. Auch dies zeigt die hohe Wertschätzung, die Jens Möller von „seinem" wissenschaftlichen Nachwuchs und seinen Kolleginnen und Kollegen entgegengebracht wird.

Wir freuen uns, dass es gelungen ist, sowohl die inhaltliche als auch die methodische Vielfalt widerzuspiegeln, die sich in den Arbeiten von Jens Möller zeigt. So besteht dieser Band aus theoretischen bzw. Überblicksbeiträgen, Studien mit querschnittlichen wie auch prospektiven Designs sowie aus experimentellen Arbeiten, die Jens Möller stets besonders wichtig sind. Im Forschungsfeld zu selbstbezogenen Kognitionen geht es zunächst um das Internal/External-Frame-of-Reference-Modell (I/E-Modell) sowie um dimensionale Vergleiche. Eröffnet wird dieser Teil durch eine Überblicksarbeit zur Theorie Dimensionaler Vergleiche, die von Jens Möller entscheidend mitgestaltet wurde (Marsh, Dicke, Seaton, Parker, Guo & Craven). Es folgen zwei empirische Originalarbeiten, die sich mit der Moderation der Vergleichsprozesse im I/E Modell (Zimmermann, Becherer & O. Köller) sowie Determinanten und Konsequenzen akademischer Selbstkonzepte (Pohlmann & Streblow) befassen. Der nachfolgende Beitrag untersucht Fragen zur unterschiedlichen Wichtigkeit sozialer, temporaler und dimensionaler Vergleiche bei allgemeinen und akademischen Selbstbeschreibungen (Helm, Müller-Kalthoff & Nagy). Schließlich wird in zwei theoretischen Beiträgen die Anwendung der Theorie Dimensionaler Vergleiche auf Agency und Communion als fundamentale Dimensionen sozialer Urteilsbildung erörtert (Abele) und ein Plädoyer für den stärkeren Einbezug des sozialen Selbst in die Forschung zu Zusammenhängen von Selbst und lernrelevanten Outcomes gehalten (Hannover & Zander). Ergänzt werden die Artikel zu diesem Forschungsfeld

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durch einen Beitrag zu den Auswirkungen von Self-Affirmation auf Effekte von Stereotype Threat (M. Köller & Nagy). Der zweite Teil bündelt Forschungsarbeiten zu sprachlichen Kompetenzen. Dieser Bereich wird durch zwei Beiträge zu Lesefähigkeit und Lesemotivation eröffnet. Zunächst wird die Relevanz elterlichen Vorlesens für die Lesemotivation und das Leseverstehen im Grundschulalter untersucht (Stutz & Schiefele). Der zweite Beitrag befasst sich mit indirekten Effekten des Leseselbstkonzepts über Lesegewohnheiten auf die Leseleistung von Schülerinnen und Schülern (Retelsdorf & Schmidt). Es folgen drei Artikel zum Fremdsprachenerwerb im Fach Englisch. Zunächst steht der Vergleich von Rechtsschreibstrategien immersiv und monolingual unterrichteter Kinder im Vordergrund (Fleckenstein, Reble & Hohenstein), der ein Beitrag zur Beschreibung des Englischunterrichts aus Perspektive der Schülerinnen und Schüler in der gymnasialen Oberstufe folgt (Keller, Krüger, Leucht & O. Köller). Abschließend wird untersucht inwieweit die Ziele gymnasialen Fremdsprachenlernens von Abiturientinnen und Abiturienten erreicht werden (O. Köller, Leucht, Fleckenstein & Baumert). Im dritten und letzten Teil dieses Buchs sind Beiträge zur Professionalisierung von Lehrkräften versammelt. Dieser Abschnitt wird durch einen Beitrag zur Frage nach Typen von Lehramtsstudierenden hinsichtlich ihrer Studienwahlmotivation eröffnet (Streblow & Pohlmann). Als zweites folgt ein Artikel, in dem unterschiedliche Ausprägungen von Eigenstereotypen von Lehramtsstudierenden und deren Erleben von Stereotype Threat untersucht werden (Ihme). Der dritte Artikel untersucht Zusammenhänge von Urteilsgenauigkeit und Urteilssicherheit ebenfalls im Lehramtsstudium (Kaiser & Südkamp). Es folgt ein Beitrag zur Vorhersage des Wohlbefindens von Lehrkräften durch globale Persönlichkeitseigenschaften (Roloff, Klusmann, Lüdtke & Trautwein) und schließlich ein Artikel, der sich mit dem Zusammenhang des Wissens von Lehrkräften und dem von Schülerinnen und Schülern befasst (Kleickmann, Steffensky & Wendt).

Unser Dank gilt allen Autorinnen und Autoren für die zumeist pünktliche Lieferung der Beiträge, die durchweg unkomplizierte Zusammenarbeit und ihre Diskretion bei der Zusammenstellung dieses Jubiläumsbandes. Zudem danken wir den anonymen Gutachterinnen und Gutachtern, die in einem doppelt-blinden Begutachtungsverfahren zur Qualität der Texte beigetragen haben (siehe Verzeichnis der Gutachterinnen und Gutachter). Für die Unterstützung bei der Gestaltung und dem Satz des Buchs danken wir Karin Vierk und Sonja Taut vom Leibniz-Institut für die Pädagogik der Naturwissenschaften und Mathematik in Kiel (IPN) sowie Annika Siegenthaler ebenfalls vom IPN und Ole Gries von der CAU für die Unterstützung beim Korrekturlesen der Beiträge. Schließlich danken wir dem Waxmann Verlag in Münster und hier insbesondere Beate Plugge für die Unterstützung beim Lektorat und bei der finalen Druckabwicklung.

Dortmund und Kiel im Juli 2017,

Jan Retelsdorf, Friederike Zimmermann, Anna Südkamp und Olaf Köller

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Dimensional Comparison Theory: Something Old, Something New, Something Borrowed, Something Blue

HERBERT W. MARSH, THERESA DICKE, MARJORIE SEATON, PHILIP D. PARKER, JIESI GUO, AND RHONDA CRAVEN

ABSTRACT: Every once in a while two mindsets with common interests, mutual respect, and dedication meet, engage in a partnership, and commit to something big. The reader might now be inclined to think of a romantic relationship, might imagine a wedding with cake, or even happy children, as a result of such an encounter. And indeed, in this chapter we are referring to something comparable; at least in part (and without a cake). This chapter deals with the development of Dimensional Comparison Theory (DCT), an extension of the I/E model that posits that self-evaluations are based on dimensional comparisons (e.g., accomplishments in different domains), as a result of continuing research collaboration by Möller and Marsh (2013). Here we illustrate new predictions, theoretical insights, and methodology associated with the I/E model and its extension into DCT considering multiple academic domains (e.g., foreign language, history, biology, and math), showing significant contrast effects for far comparisons and significantly smaller contrast or assimilation effects for near domains. Viewing DCT, as the result of a successful marriage (or partnership) of research we encourage the reader to find something old, something new, something borrowed, and something blue within this chapter.

Keywords: Dimensional Comparison Theory, self-concept, academic achievement, Frame-of-Reference, assimilation and contrast

Dimensional Comparison Theory – Drum forsche, wer sich wissenschaftlich bindet

ZUSAMMENFASSUNG: Wenn zwei Gesinnungen mit gemeinsamen Interessen, gegenseitigem Respekt und Hingabe aufeinander treffen, kommt es vor, dass diese sich dazu entschließen, gemeinsam etwas Großes zu beginnen. Der Leser mag nun an eine romantische Beziehung denken, sich Hochzeitstorte und vielleicht sogar Kinder als Ergebnis einer solchen Begegnung vorstellen. Und in der Tat geht es in diesem Kapitel um etwas Vergleichbares, zumindest beinahe (und ohne Kuchen). Es geht um die Entwicklung der Dimensional Comparison Theorie (DCT) – eine Erweiterung des I/E-Models, welches besagt, dass Bewertungen des Selbst auf dimensionalen Vergleichen beruhen (z.B. Leistung in verschiedenen Domänen) – als Ergebnis der andauernden Zusammenarbeit von Möller und Marsh (2013). Es werden neue theoretische und methodische Erkenntnisse bezüglich DCT, welche verschiedene akademische Domänen (z.B. Fremdsprachen, Geschichte, und Physik) berücksichtigt, vorgestellt. Es zeigen sich signifikante Kontrasteffekte für weiter entfernte Domänen,

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aber signifikant kleinere Kontrasteffekte oder sogar Assimilationseffekte für ähnliche Domänen. Da wir DCT als Ergebnis einer erfolgreichen Forschungsehe (oder -partnerschaft) betrachten, wird der Leser dazu eingeladen, in diesem Kapitel etwas Altes, Neues, Gebrauchtes sowie Blaues zu finden.

Schlüsselwörter: Dimensional Comparison Theory, Selbstkonzept, Akademische Leistung, Bezugsrahmen, Assimilation und Kontraste

Introduction

Self-concept, the perception of oneself (Marsh, 2007), is one of the *old*est constructs in psychology and the social sciences more generally (Marsh, Lüdtke et al., 2015; Möller, Pohlmann, Köller, & Marsh, 2009). It is a critical component in the positive psychology revolution, which focusses on how healthy, normal, and exceptional individuals can get the most from life (e.g., Marsh, 2007; Marsh & Craven, 2006; Seligman & Csikszentmihalyi, 2000). Thus, self-concept plays a major role in enabling humans to thrive and ensure wellbeing as it is not only an important outcome itself (i.e. positive self-concept), but also a mediator for many other important and desirable psychological and behavioral outcomes (Marsh, 2007). In this chapter we begin with an overview of self-concept research underpinning and supporting the Internal/External Frame of Reference (I/E) model and its extension generalization to Dimensional Comparison Theory (DCT). We then review the relation of DCT to other major self-concept theories (e.g., fish little pond effect, BFLPE; reciprocal effects model, REM) and discussion of policy and practical implications.

In research on self-concept it is important to take into account the multidimesional hierarchical structure of self-concept, as proposed by Shavelson, Hubner, and Stanton (1976). According to Shavelson et al. (1976), self-concept consists of an overarching global factor, which can then be broken down into academic self-concept (ASC) and non-academic self-concepts such as physical, emotional, or social self-concept. These higher order self-concept factors can then, in turn, be broken down into lower level self-concept factors. In particular, ASC consists of self-concept factors of various academic sub-domains, such as math, English (or other languages), and science.

However, Marsh and Shavelson (1985) subsequently revised the hierarchical structure of the ASC. They found that despite the routinely observed high correlations between math and verbal achievements (typically .5 to .8, see Marsh, 2007), the math and verbal self-concept factors were nearly uncorrelated. Hence, in the revised model Marsh & Shavelson proposed two higher order ASCs: verbal academic self-concept (VSC) and math academic self-concept (MSC). These factors could then be considered opposite poles on a continuum of numerous subject-specific ASCs ordered along this line (see Figure 1). Within this continuum, based on

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the aforementioned correlations, subjects such as physics and math are considered to be close to the math domain, while native and foreign languages are closer to the verbal domain. These interesting findings have provoked the question as to why ASCs should show a very much different pattern than academic achievement itself. The I/E model was developed to explain these near-zero correlations (Marsh, 1986, 1990a) and is the theoretical base of Dimensional Comparison Theory (DCT).

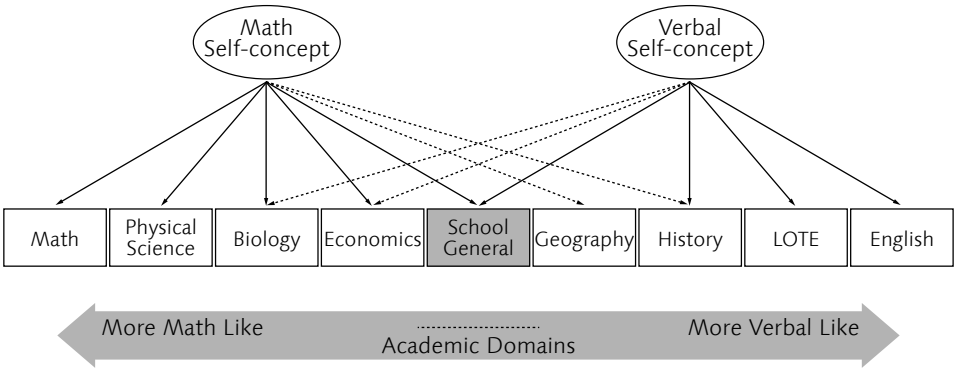

Figure 1. The Marsh/Shavelson revised academic self-concept model, which includes a wider variety of specific academic facets. LOTE: Language other than English (in reference to English-speaking students).

1 Something Old: The Internal/External Frame of Reference (I/E) Model

According to the I/E model many people think of themselves as mostly math or mostly verbal persons, even though individuals who are good at one also tend to be good at the other (see Marsh, 1986, 1990a). The I/E model posits that ASC in a particular school subject is jointly formed in relation to two different frames of reference: (1) an external (social comparison) reference in which students compare their self-perceived performances in a particular school subject with the perceived performances of other students in the same school subject; and (2) an internal (dimensional, ipsative comparison) reference in which students compare their own performances in the particular school subject with their own performances in other school subjects. Hence, students may have a favorable MSC if math is their best subject, even if they are not particularly good at math relative to other students. Methodologically speaking, the model on the one hand postulates positive regression effects of achievement on ASC within each domain (good verbal skills lead to higher VSC and good math skills lead to higher MSC; see Figure 2) based on external comparison

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processes (Marsh, Möller et al., 2015). Due to internal comparison processes, on the other hand, the model also postulates negative marginal effects of achievement on ASCs across domains (good math skills lead to lower VSCs once the positive effects of good verbal skills are controlled for, and better verbal skills lead to lower MSCs once the positive effects of good math skills are controlled for; see Figure 2). Thus, two students with the same ability in English will report different VSCs depending on their achievement in math i.e., the student with the better math skills will report lower VSC (Marsh, 1990a).

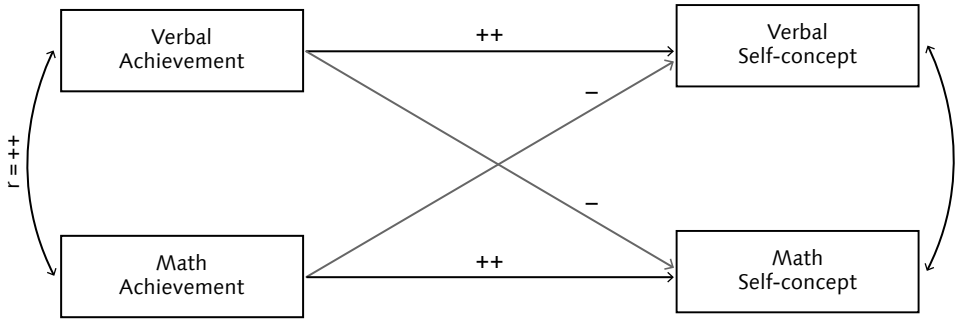

Figure 2. The 'Classic' Internal/External Frame of Reference (I/E) Model. According to predictions from the I/E model, the horizontal paths from achievement to self-concept in the matching domains (content area) are predicted to be substantial and positive (++), whereas the cross paths from achievement in one domain area to self-concept in a non-matching domain (in grey) are predicted to be negative (–).

1.1 Empirical research on the I/E model

A growing body of research, using various approaches, has shown consistent support for the I/E model assumptions (Marsh, 1986, 1990a, 2007; Möller & Marsh, 2013). For example, cross-cultural comparisons have validated the model in more than 35 countries including many non-English speaking Western, Asian, and Islamic countries (Marsh, Abduljabbar et al., 2015; Marsh & Hau, 2004). Indeed, Marsh and Hau (2004; also see Marsh, Hau, Artelt, Baumert, & Peschar, 2006) demonstrated that support for the predictions of the I/E model generalized over large, nationally representative samples of 15-year-olds from each of 26 countries.

Longitudinally, Marsh, Kong, and Hau (2001) replicated the model over a five year period in line with similar findings by Marsh and Köller (2004; see also Möller, Retelsdorf, Köller, & Marsh, 2011). Other studies have found the I/E model to be useful for predicting academic choices over a long-term (Nagy, Trautwein, Baumert, Köller, & Garrett, 2006; Parker, Marsh, Ciarrochi, Marshall, & Abduljabbar, 2014; Parker et al., 2012). For example, math achievement and MSC positively predicted

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choosing math related advanced courses and entry into university majors in math and the physical sciences, but negatively predicted verbal related advanced courses and entry into university majors of the humanities (Parker et al., 2012).

The model has also been validated using introspective diary studies and experimental designs. For example, in two diary studies, Möller and Husemann (2006) confirmed that students spontaneously carry out dimensional comparisons in everyday life, with contrast effects from one domain to self-evaluations and emotions in the other. Experimentally, Möller and Köller (2001) and Pohlmann and Möller (2006, 2009) showed how manipulated feedback on either verbal or math achievement in one subject area had an inverse effect on ASC in a different area.

Meta-analyses have also provided support for the model. Möller, Pohlmann et al. (2009) conducted a meta-analysis of 69 datasets (n = 125,308). They only included studies that simultaneously evaluated the effects of math and verbal achievements on MSC and VSC. Results revealed a high correlation of math and verbal achievements (.67), but nearly uncorrelated MSCs and VSCs (.10) across all studies. Path coefficients from achievement to ASC in the matching domains were positive (.61 for math, .49 for verbal) but negative from math achievement to VSC (–.21) and verbal achievement to MSC (–.27). Support for the I/E predictions generalized across age group, gender, and country.

1.2 Generalized I/E Model

While the origins of the I/E model are based on the relation between academic achievement and ASC, researchers have found that it can be extended to other variables as well (see Möller, Müller-Kalthoff, Helm, Nagy, & Marsh, 2016). Arens and Möller (2016) found evidence of I/E-like effects for the relation of students' achievement (grades) and students' perceptions of the learning environment (student-teacher relations and instructional quality). Based on the TIMSS (2007) data Marsh, Abduljabbar et al. (2015) showed support for I/E predictions generalized to intrinsic motivation. Goetz, Frenzel, Hall, and Pekrun (2008) also found support for the I/E model in relation to both ASC and enjoyment but showed that achievement/enjoyment relations were mediated by ASC. This finding is in line with Schurtz, Pfost, Nagengast, and Artelt (2014) who demonstrated the same pattern of results for subject interest. Utilizing expectancy/value theory (EVT; Guo, Marsh, Parker, Morin, & Dicke, 2017, Wigfield & Eccles, 2002), Dietrich, Dicke, Kracke, and Noack (2015) examined the effects of teacher support on students' intrinsic value and effort with regard to math and German language. They demonstrated that teacher support in math was negatively related to students' intrinsic value and effort in German and vice versa.

The model has also been extended by examining ASC as perceived by others. Although previous reviews (e.g., Marsh et al., 2014; Marsh, Möller et al., 2015) suggested that the I/E model may not apply to perceptions by others, recent research by van Zanden et al. (2017) suggests that this conclusion might be prema-

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ture. Van Zanden et al. assessed student ASCs and achievements in the math and verbal domains achievements, but also assessed matching parent perceptions of the student's ASC. Van Zanden et al. showed that support for the I/E model based on student responses generalized to parents' perceptions of their child's ASCs.

2 Something New, Something Borrowed: Assimilation, Contrast and Dimensional Comparison Theory

So far we have reviewed the I/E model. But what is *new* about DCT and why is it so important? Historically, I/E research has focused on the math and verbal domains (Marsh, Möller et al., 2015), but the I/E model is truly based on a continuum of academic domains that vary between the end-points of mathematical and verbal subjects (Figure 1; see also Marsh & Yeung, 2001). Now, for an elegant elaboration of our title theme we will cautiously say that DCT *borrows,* but actually we mean extends*,* the core assumptions of the I/E model, applying them to this continuum (Möller & Marsh, 2013; Marsh, Lütdke et al., 2015) and also positioning this model more broadly into frame of reference research. Two frequently posited frames of references are temporal and social comparisons (Möller, 2005; Möller et al., 2009; Möller et al., 2011); self-perceptions are based in part on comparisons of one's own accomplishments and skills with one's own past performances (temporal) as well as with others' performances in one's immediate and relevant context (social). Particularly in educational settings, however, a growing body of research based on the I/E model (Marsh, 1986) demonstrates that self-perceptions may also be the result of internal comparisons, in which accomplishments in one school subject can serve as a frame of reference for another school subject—hereafter referred to as "dimensional" comparisons. Acknowledging the importance of this long understudied frame of reference perspective, in 2013 Möller and Marsh proposed Dimensional Comparison Theory (DCT) as an extension of the already established I/E theory.

DCT expands and theoretically explains (Möller et al., 2016) the I/E model to include a wider variety of academic domains. As a result cross-paths involve "near" and "far" comparisons in relation to how similar or dissimilar different school subjects are to each other. While far comparisons should provoke contrast effects (negative effects of academic achievement in one subject on ASC in the other), near comparisons will result in diminishing contrast effects or assimilation effects (positive effects of academic achievement in one subject on ASC in the other; Möller & Marsh, 2013; Marsh, Lüdtke et al., 2015). A possible explanation for these processes is that students believe achievement in far subjects to require different sets of competencies and thus, to be uncorrelated, or even negatively correlated (e.g., English and math; Jansen, Schroeders, Lüdtke, & Marsh, 2015; Möller & Marsh, 2013), despite their actual empirical high positive dependency. For near comparisons students most likely consider the subjects to be more similar and complementary such that accomplishments in one subject are closely related to accomplishments in related subjects, e.g.,

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math and physics (Jansen et al., 2015; Möller & Marsh, 2013; Möller, Streblow, Pohlmann, & Köller, 2006). A recent study by Helm, Müller-Kalthoff, Nagy, and Möller (2016) experimentally investigated the causal effect of perceived subject similarity on domain-specific ASCs and indeed found that induced lower perceived subject similarity led to stronger ASC differences than did higher perceived similarity, even for subjects that were assumed to be near (e.g., math and physics).

3 Empirical Research on DCT

Empirically, results on contrast and assimilation effects are in part still inconsistent. Having already provided much evidence for the contrast effects of math and verbal with regard to the I/E model we now focus on results including several near and far comparisons of subjects over and beyond math and verbal.

3.1 DCT studies focusing on the academic context

Focusing on the math end of the continuum, Möller et al. (2006) found that math achievement had a positive effect on physics self-concepts. Further, Parker, Marsh, Lüdtke, and Trautwein (2013) found science achievement to positively predict MSC, even after controlling for science achievement. A study by Jansen et al. (2015), however including biology, physics, and chemistry as separate science subjects as well as math and German shed light on these seemingly contradictory findings. They found small assimilation effects between math achievement and physics and chemistry self-concept, as well as among all sciences included in their study. Moreover, Jansen et al. (2015) found contrast effects between achievement in German and physics and chemistry self-concept, but more importantly between achievement in math and biology self-concept. Thus, they deduced that in studies using mixed science subjects these contrasting effects (that they find to be stronger than the assimilation effects) of math achievement and the biology component could overshadow the assimilation effects of the other science components (Jansen et al., 2015).

For the verbal domains some studies (e.g., Marsh & Yeung, 2001; Marsh et al., 2001) have found negative (i.e., contrast) effects between subjects of the verbal domain (e.g., Xu et al., 2013). More recent studies, based on stronger statistical methodology than previously used in I/E research (e.g., Marsh et al., 2014), however, have shown that for standardized test results there were positive predictions (i.e., assimilation effects) of Dutch and English achievement on self-concept in English and self-concept in Dutch respectively and negative (contrast) effects of math achievement on both language self-concepts. For class marks they found a similar pattern, although the near comparisons were not positive. However, as a test of the differences of near and far comparisons showed, in both cases the far comparisons were significantly more negative than the near comparisons. Similarly, Ehm,

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Lindberg, and Hasselhorn (2014) found such assimilation effects between writing achievement and reading self-concept, while math achievement and reading self-concept were negatively related as were reading achievement and MSC, again indicating contrast effects.

In one of the most comprehensive DCT investigations (comprised of two studies) so far, Marsh, Lüdtke et al. (2015) supported DCT predictions in relation to domains spanning the academic continuum (Figure 3; German, English, history, biology, physics, and math). Although they only found actual positive (assimilation) effects for near comparisons in their second study, both studies showed significant differences between near and far comparisons of all subjects. Overall, there has been consistent support for diminishing contrast effects for increasingly "near" academic domains, but support for the shift in direction from contrast to assimilation has been mixed.

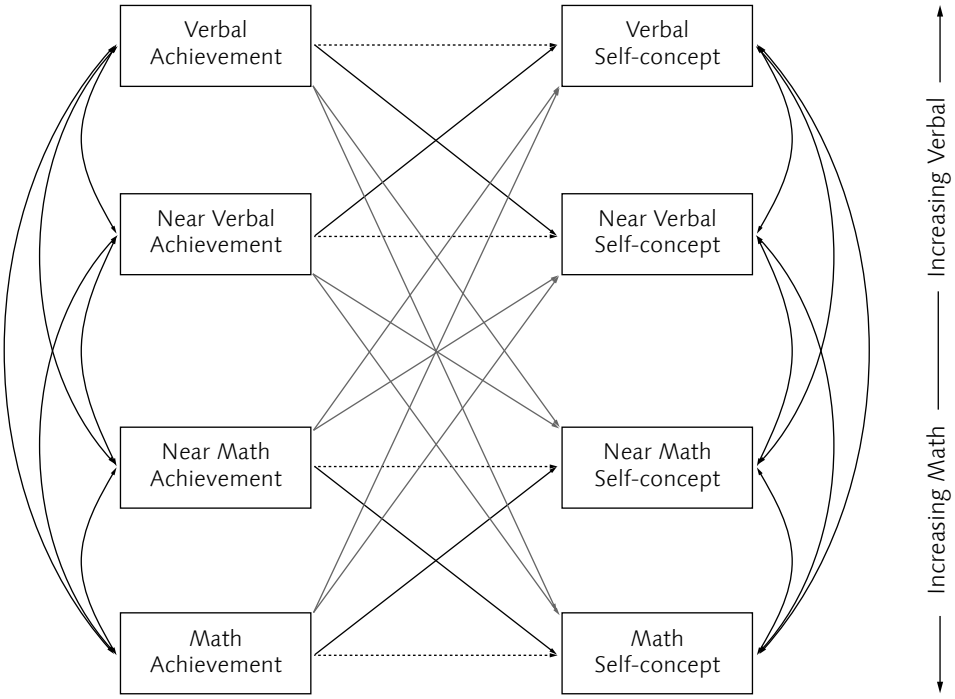

Figure 3. Extending the I/E model to include the verbal domain, one or more verbally-related domains, the math domain, and one or more math-related domains. Far cross paths (in grey; any of the math domains to any of the verbal domains) are again predicted to be negative. However, the near cross paths (in black; relating the different verbal domains to each other, or the different math domains to each other) are predicted to be significantly less negative, non-significant, or even positive (assimilation).

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3.2 DCT studies beyond achievement and ASC

DCT research has focused on achievement and ASC, but has been extended to include other variables. While staying within the realm of academia, Guo, et al. (2017) focused on four science subjects (biology, physics, chemistry, and earth science) and utilized EVT in a similar manner as the aforementioned Dietrich et al. (2015) study. They showed positive relationships of achievement and ASC for near (physics with chemistry) domains and negative relationships for far domains (physics with biology and chemistry with biology). Cross-paths between earth science and the other science domains were slightly positive or non-significant. The pattern was the same for intrinsic value (Guo et al., 2017). Further, when predicting aspirations through motivational beliefs, paths between physics and biology were significantly negative. Again, the pattern of results was found for ASC and intrinsic value but not utility value. However, the majority of these cross-paths involving ASC, intrinsic value, and utility value were non-significant or slightly positive (see also Guo, Parker, Marsh, & Morin, 2015).

3.3 DCT outside of the realm of academia

Much of the research reviewed thus far has focused on the effects of dimensional comparisons within academic domains. For validating the theory it is important to also use standards of other domains. This research, however, is still scarce (Möller & Marsh, 2013), although there are exceptions (e.g., Möller & Husemann, 2006; Möller & Savyon, 2003; Möller & Weber, 2001). Focusing on the general nature of dimensional comparisons, conducting several diary studies, Möller and colleagues found that participants (adults aged 65–92 years) who were asked to compare self-evaluations on three dimensions (mental flexibility and memory, physical fitness and health, coping with problems) preferred dimensional over social and temporal comparisons, as these resulted in more positive self-evaluations (Möller & Weber, 2001). This is not surprising as other studies revealed that people also tend to prefer upward dimensional comparisons which are related to a positive affective state (Möller & Husemann, 2006). Further, these studies showed that most dimensional comparisons are based on domains from the same context, most frequently from academic categories, followed by personal relationships.

In a study of self-concepts in relation to intelligence (ASC) and honesty, Möller and Savyon (2003) demonstrated that rating oneself as more honest than intelligent depended on the level of ASC. Thus, only students with low ASC believed themselves to be more honest than intelligent. In their second study they experimentally manipulated feedback on an academic task, showing that participants who had received negative feedback (failure) rated themselves as significantly more honest than participants who had reviewed positive feedback (success). Möller and Savyon concluded that following failure, participants tended to overestimate their honesty more strongly than following success.

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4 Extensions of DCT Studies: Integration with other ASC Models

As demonstrated, the development of ASC is undoubtedly closely linked to dimensional comparison processes. Hence, other theoretical models dealing with ASC and achievement, such as the reciprocal effects model (REM) and the big-fish-little-pond effect (BFLPE), although traditionally focusing on a single domain of ASC have started integrating a dimensional perspective.

4.1 Reciprocal Effects Model (REM) and DCT

The reciprocal effects model was first introduced by Marsh (1990b; see also Marsh & Craven, 2006). Their goal was to find a satisfactory answer as to whether academic achievement was a predictor or cause of ASC. Based on theoretical and empirical evidence Marsh and Craven (2006) proposed a dynamic REM, in which both ASC and achievement are causes and effects of each other (Figure 4). REM posits that both sets of paths are statistically significant, but the linkages from prior ASC to subsequent achievement are particularly important. There now exists substantial support for the generalizability of the findings over age, nationality, attendance at academically selective and non-selective schools, and different measures of ASC and achievement (Marsh & Craven, 2006; Seaton, Marsh, Parker, Craven, & Yeung, 2015; see also Retelsdorf, Köller, & Möller, 2014). Expanding this model to incorporate more than one academic domain, Marsh and Yeung (1997,

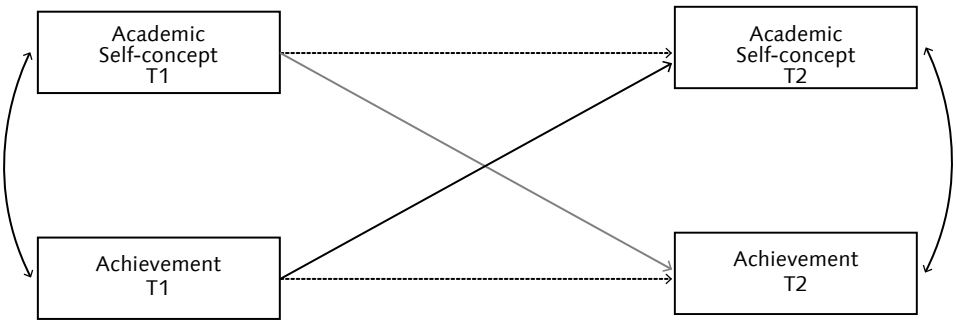

Figure 4. Prototypical reciprocal-effects model. In this model, academic self-concept and achievement are collected in two successive waves (T1 and T2). Within each wave, academic self-concept and achievement are assumed to be correlated. Paths connecting the same variable on multiple occasions reflect stability (dashed). The solid black line reflects effects of prior achievement on subsequent self-concept, whereas the grey lines reflect the effects of prior self-concept on subsequent achievement.

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1998; see also Marsh, 1989) developed early support for what was subsequently called the Reciprocal Internal/External frame of reference model (RI/EM; e.g., Marsh & Köller 2004; Möller et al., 2011). In particular, Möller et al. (2011) not only found good support for both models considered separately but also found positive longitudinal effects for their integration: positive effects of grades and ASCs on subsequent grades and ASCs within matching domains (consistent with the REM); negative effects of grades on subsequent ASCs across non-matching domains (consistent with dimensional comparison processes of DCT); and negative effects of ASCs in one domain on grades in a non-matching domain (new to the integration of DCT and REMs, but consistent with the logic of DCT). Recently, Möller, Zimmermann, and Köller (2014) replicated this pattern of results with test scores rather than school grades.

4.2 Big-Fish-Little-Pond Effect (BFLPE) and DCT

Another important ASC model, namely the Big-Fish-Little-Pond Effect (BFLPE; Marsh, 1984; Marsh & Parker, 1984; see also review by Marsh et al., 2008) is also based on a frame of reference effect, but emphasizes a social comparison perspective integrating a variety of different theoretical models (e.g., relative deprivation theory, social comparison theory, psychophysical judgment, and social judgment). In the BFLPE model, students are hypothesized to compare their abilities with the abilities of their classmates and to use this social comparison impression as one basis for forming their own ASC. The model hypothesizes that individual ability is positively related to ASC (the brighter I am the higher my ASC) but school-average ability has a negative effect on ASC (the brighter my classmates, the lower my ASC). Extensive support for the BFLPE generalizes across student groups, subject domains, ASC instruments and cultures (see review by Marsh, 2007; Marsh et al., 2008). However, again nearly all of the research on the BFLPE to date is based on a single domain of ASC: typically MSC, VSC, or global ASC. Based on early research by Marsh (1990a), recent studies (e.g., Parker et al., 2013; Pinxten et al., 2015) have tried to fill this gap, by applying BFLPE models to several academic domains simultaneously, thereby combing social and dimensional comparisons. Taking into account the assumptions of the BFLPE and dimensional comparison theory, Marsh posited compensatory effects: (a) school-average ability in math should have a negative effect on MSC (the BFLPE) but a small positive effect on VSC; and (b) school-average verbal ability should have a negative effect on VSC (BFLPE) but a small positive effect on MSC. Empirical support for this hypothesis is limited, in part because school-average abilities in different school subjects is so highly correlated (e.g., $r > .95$) that they cannot be discriminated. However, evolving statistical methodology has demonstrated stronger evidence for such effects for students of German themed (magnet) schools (Parker et al., 2013) as well as Dutch elementary students (Pinxten et al., 2015).

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5 Policy and Practice Implications

In addition to social and temporal comparisons, dimensional comparisons seem to play a significant role in self-evaluation, particularly ASC. In juxtaposition to temporal and social comparisons, dimensional comparisons evoke an apparently paradoxical effect on ASC: bright students might have an average or below-average ASC in their weakest school subjects, despite their good achievement, but even poor students may have an average or above-average ASC in their best school subject, despite their below average performance in this subject. Both of these effects are paradoxical when only taking the comparison to other students into account. Considering however, the comparison of the student's performance to his or her own performance, but in a different domain, explains these effects (see also Marsh, Möller et al., 2015). Teachers might wrongly assume that students' academic emotions, interest, and motivation to learn, which are influenced by ASC, generalize across school subjects. Thus, knowledge of the apparent domain specificity of ASC formations is thus, of major importance as it will enable teachers to have a better understanding of their students and provide more appropriate, credible feedback, particularly for less able students. Additionally, awareness of dimensional comparisons is important for the students themselves. As research has shown that ASC and achievement have a reciprocal relationship, ASC also influences later achievement. Thus, low ASC in one domain, due to dimensional comparisons with a stronger domain, might lead to even lower performance in the former and higher performance in the latter domain and consequently, an even stronger pronunciation of achievement differences in these domains. In addition, the aforementioned influence of ASC on students' academic emotions, interest, and also aspirations could lead to career choices made on wrong assumptions of one's own abilities. An important point for researchers is clearly that results of studies including near and far comparisons, as proposed by DCT, suggest that comparisons depend on what domains are presented in a particular design. Thus, when presenting two specific domains to students, irrespective of which domains are presented, there is an implicit demand that they contrast responses to these domains in a manner consistent with the classic I/E model (i.e., contrast for non-matching domain) but perhaps not as consistent with the more nuanced predictions based on DCT.

6 Something Blue

Overall, this stream of research demonstrates the pressing need to expanding research horizons and *blue*-sky thinking, building on solid theoretical and empirical groundwork. Möller and Marsh (2013) have made an important step in this direction with formulating dimensional comparisons as an innovative and new theory, based on the established I/E model. Now, research needs to test and validate dimensional comparison theory, by developing novel research questions and utilizing state of the

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art methods for testing these. This kind of research is based on fruitful and engaged research collaborations such as the one of Möller, Marsh, and colleagues. It is an honor being a part of this and we are looking forward to all future ideas, projects, and an ongoing research partnership, for better and for worse.

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