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An educational experiment into how to bring discipline concepts into play: How a theoretical problem acts as a source of teacher development

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Abstract
Teacher development was never the focus of Vygotsky's research. Yet researchers who are studying teacher professional development have in recent years increasingly drawn on concepts from cultural-historical theory. Concepts relevant to child development are being used to explain how teachers in schools (Edwards et al., 2019; Ellis, 2007) and preschools (Nuttall et al., 2015) are developing their professional practices. But the question of what is developing for teachers remains unanswered. The goal of this paper is to present a study (152 hours of digital video recordings of practices, planning, professional development; including 32 hours of weekly interviews) of how two early childhood teachers over 2 years collaborated with researchers in an educational experiment (Hedegaard, 2008) to solve the theoretical problem of how to bring into their play programs discipline concepts. In line with Hedegaard (2008) and Lindqvist (1995), the results of the study do not just focus on a problem of practice, but rather examine the theoretical problem – in this study the disjunction between the leading activity of the preschool child for play, and the demands and motives of teachers for greater cognitive outcomes. When seen through institutional and personal lenses of the teachers, the ongoing small crises experienced over time when successfully resolved, bring developmental conditions for teachers. A change in teacher positioning as an outsider of children's play, to a *play position* led to a change in teacher motives.

Keywords: teacher development; cultural-historical theory; professional development; early childhood;

Introduction
The purpose of this paper is to contribute to understanding what is the content, process and psychological functions that are developing for teachers when they participate in an educational experiment. Although teacher development was never the focus of Vygotsky's research, there is now an increasingly larger number of studies which draw on concepts from cultural-historical theory to guide the design and analysis of the professional development of teachers (Ebadi, and Gheisari, 2016; Edwards et al., 2019; Ellis, 2007; Grimmett, 2014; Murphy, et al., 2015; Tasker et al., 2010).

What is known about the professional development of teachers who draw on cultural-historical theory has come from theoretical papers centered around 1) theorising relevant concepts for teacher development; and 2) empirical research that draw on specific cultural-historical concepts to analyse and theorise their data.

What the theoretical works show is a broad set of concepts: mediation, inter- and intra-psychological functioning, social situation of development, ideal and real form of development, imitation, everyday and scientific concepts, and the zone of proximal development (Ebadi & Gheisari, 2016; Eun, 2008, 2011). These concepts are directly related to Vygotsky's system of concepts for theorising child development.

The empirical studies bring forward how the processes of inquiry (Johnson et al., 2020), coteaching (Murphy, et al., 2015), critical reflection (Ebadi &Gheisari, 2016), collaborative inquiry related to subject matter knowledge (Ellis, 2007), motives and competencies

(Grimmett, 2014) and object motives (Nuttall et al., 2015) can bring about practice change. Importantly, the works of Edwards et al., (2019) brings out how motives develop for teachers, and their research gives directions to researchers interested in studying teacher development. They state, "Motive orientation could be seen through how a teacher comes to respond to demands of practice, where their 'activities in activity settings are themselves located within practices which highlight what is valued within them, creating a developmental niche in which motive orientations are reinforced to ensure a good fit" (p. 213).

Although we know some things about the conceptual content (Eun, 2008, 2011) and the psychological functions that researchers have found are developing for teachers (Edwards et al., 2019; Grimmett, 2014; Nuttall et al., 2015), we do not yet know if and how teacher participation in an educational experiment which is the focus of this paper, contributes to teacher development.

In order to answer the research question driving this paper, we begin by discussing the method, followed by a presention of the results of the research, and conclude with a discussion on how an educational experiment with its focus on a theoretical problem supports teacher development.

Methods

The method adopted to study teacher development was an educational experiment. An educational experiment has an important conceptual genealogy in cultural-historical theory, primarily beginning with V.V. Davydov's study of secondary teaching contexts, and emerging again with the writings of Gunilla Lindqvist, Lada Aidarova, and Mariane Hedegaard in relation to teachers of young children. Although the conceptual elaborations are nuanced to each researcher's specific study agenda, what is common is that researchers and teachers work in collaboration in educational settings on a theoretical problem.

Foundational to an educational experiment is the epistemological essence of the theory of generalisation and concept formation. Davydov (1990) argued in his time that the theoretical literature lacked a critical analysis of how in general educational instruction abstraction, generalisation and concept formation takes place. He suggested that what prevails is 'school logic'. In school logic mental transitions are conceptualised as moving from individual situations to the general during learning instruction. In school logic, empirical knowledge becomes the building blocks, one stacked upon the other, until a general understanding is formed. This is mirrored in how the scope and sequence of curriculum is framed, where big ideas are broken down into smaller blocks, and these are consumed one block at a time in educational settings.

Davydov (1990) challenged the premise of school logic with its foundations in empirical knowledge formation by suggesting that historically, "The world of objects that are used by mankind [sic], and the orientation to them, have gradually become a basis for the operation of the analyzers themselves" (pp. 239). Specifically, Davydov (1990) suggested that a concept or "definition should express the reason why the given thing *arose,* the method of *constructing* it" (p.251; original emphasis). In contrast to school logic, the development of concepts results from societal needs to solve problems, such as needing measurement (standard unit) to more efficiently and equitably engage in trade. A standard unit arose from the practices and activities of humans, and the resulting concepts Davydov (1990) argued, can only be truly understood when instruction rises to these concrete situations.

Tracing the evolution and development of a concept in the context of a societal need is not about going from the individual to the general as in school logic, but rather from the general societal problem to the concrete practice in which the concept evolved (standard unit) to solve the problem (trade). Davydov (1990) argued that a study of how a concept is developed gives a very different form of instruction and builds very different kinds of thinking. He introduced the idea of theoretical thought or dialectical thinking to capture this different kind of logic. The focus of Davydov's (1990) research was secondary students. How teachers work with theoretical problems and engage in theoretical thinking themselves, was not the focus of his research attention. Even though theoretical thinking is foundational to an educational experiment, researchers have been interested in researching the developmental conditions for children. *Therefore, little is known about how an educational experiment with its focus on a theoretical problem creates developmental conditions for teachers*. Even though Hedegaard and Chaiklin (2005) and Lindqvist (1995) have revealed new models of practice through an educational experiment, their attention was the children and not the teachers.

In introducing theoretical thought, Davydov (1990) opened up another important idea which is also foundational for an educational experiment. He introduced the idea of children building a general model so they could show the relations between the elements within a conceptual unit.

With this logic of a model, Davydov (1990) brought forward the idea that all concepts must sit within a system of human activity, and they can be captured together as relational concepts. In this relational system of concepts, models develop as scientific abstractions of relational units, but they should not lose their original characteristics.

Rather than study fossilised and established models, as Vygotsky (1997) warned as limiting, it is important to study the development of the dynamic relations of concepts within a system in order to capture the essence of the whole. Davydov (1990) introduced modelling as a means of scientific cognition in instructional settings so that the essence of the unit as relational concepts within a system, could be made visible to school children.

When considering the focus of this paper, modelling within an educational experiment is oriented to children's scientific cognition. Yet the teaching model that develops through the process of the educational experiment dynamically capture the content and process of practice change. How this double form of modelling builds over the course of an educational experiment, and how these new teaching practices of the teachers develop the teachers themselves, has not been the focus of previous research. But Hedegaard offers some guidance on how to analyse from a wholeness perspective this complexity and double modelling.

In our study the theoretical problem of the educational experiment was how to bring discipline knowledge into children's play. In line with Hedegaard's (2008) educational experiment, we were not only oriented to a theoretical problem, but we wanted to develop a model of practice that could capture dynamically the results of the educational experiment. We took inspiration from Hedegaard's dialectical-interactive method (see Table 1) and extended this so that we could also study the conditions that the educational experiment created for teachers' development.

Table 1: Dialectical-interactive method (adapted from Hedegaard, 2008: 35)

Research method	**Research principle**	**Knowledge form**	**Knowledge content**

Experiment as intervention into everyday practice in a play-based setting	Theoretically planned interventions into local practice of how to bring concepts into play practice	Dialectical-theoretical knowledge formation	General conditions for activity in local situations of the preschool

Procedure:
Data sets from two periods of a 2 year educational experiment were gathered. In the first period which took place in the final ten weeks of the first year, the teachers participated in the educational experiment in which they sought to bring discipline concepts into the teaching approach of a playworld of The Adventures of Alice in Wonderland (Lewis Carroll). In the second period the teachers participated in a full year of four consecutive playworlds. The stories that drove those playworlds were Charlotte's Web (E.B. White), The Magic Faraway Tree (Enid Blyton), The Lorax (Dr Suess) and Robin Hood (folktale).

A playworld has been presented in the literature in a number of ways, relative to the country specific context and societal needs. The original educational experiment by Lindqvist (1995) sought to study how drama could be brought into a kindergarten program, and from this she developed the aesthetics of a common playworld. Others (e.g., Hakkarainen et al., 2013) have brought forward her original research in their study of teacher practices and children's development. But this important research did not focus specifically on teacher development, but was more oriented to children. However, this body of work inspired us to draw on Lindqvist's original model as a productive beginning point in developing the content of the educational experiment into how to bring discipline concepts into children's play. The playworlds gave a model of teaching and a common focus for the researchers and the teachers engaged in the theoretical problem they were seeking to solve.

In our study we followed the general principles of an educational experiment by drawing on the dialectical-interactive approach described by Hedegaard (2008) and shown in Table 2 Column 1 below, and we add to this our common approach of a playworld (Column 2) to help solve the theoretical problem guiding the educational experiment.

Table 2: Dialectical-interactive approach of an educational experiment (adapted from Hedegaard, 2008: 45)

Dialectical-interactive approach (Hedegaards, 2008, 45)	**Focus of the teacher-researcher collaboration**
Theoretical preconcepts are formulated as relations.	Subject positioning (Kravtsov &Kravtsova, (2010); everyday and scientific concept formation (Vygotsky, 1987); Conceptual Play (Fleer, 2011).
Model to depict relations.	Playworld (Lindqvist (1995)
The activities that create the changes have to be the objects of study.	Weekly reflections on practices; joint planning to support next steps.
The social situation is specified so that interactions between participants can be documented.	Digital video and photographs of practices and artefacts, blog capture, Weebly, email correspondence.

Two perspectives - researched person's and the researchers' perspective.	Teachers were focused on "How to bring concepts into play" and the researchers were oriented to supporting the development of a model that captured the successful teaching practices as a dynamic whole.

Sample:
Two teachers (Ruth and Olivia) consented to participate in the educational experiment. Both had over ten years of teaching experience, and both had a 4 year university teaching degree. The teachers brought the children together a minimum of twice a week for the teaching project that formed the basis of the educational experiment.

In Year 1 there were 18 children (range 3.5-5.8; mean=4.6 years) and in Year 2, there were 13 children (4.7-6.4; mean=5.4 years). The school where the preschool and the classroom were located in is a middleclass community, primarily of European heritage families.

Data collection:
Two cameras captured the teachers each week in the educational experiment of a common playworld. A total of152 hours of data were generated, of which 32 hours was interviews and related planning.

Analysis:
We also drew upon the concept of crisis (Vygotsky, 1997) in order to theorise how the demands and motives were changing during the course of the educational experiment. In line with Hedegaard (2008) we know that motives develop in institutional practice and therefore, motive "development takes place in activities where a shared engagement and orientation in social interaction" (p. 192).

Results
The results are presented as exemplars from data sets of the two-year educational experiment. The findings cluster around three themes which are discussed in turn.

The educational experiment brought changes in the dominating motives of the teachers
We found that within a playworld model, the theoretical problem of bringing discipline concepts into children's play so that these concepts were personally meaningful, brought with them new demands on the teachers. Three examples follow.

First, we found that the new practices within the activity settings meant that the teacher's position as the adjudicator of children's behaviour had to change.

> Part of teaching is having control, to always facilitate. So then to go into character, I feel like I would lose control if someone needed help or they would need to go to the bathroom or all of these things that you help children with all of the time as a teacher (Rutha - P010 H2 Ruth interview part 2).

The small crisis surrounding teacher authority and behaviour manager was resolved as both Ruth and Oriana drew on the imaginary situation to guide children, as was observed in an incident within a playworld of Robin Hood in which the children and teachers were going back in time to visit the castle engineer. A dangerous knife was left in the fort in the outdoor area, and Ruth said to the children in character, "Don't go in there (castle dungeon). There is a dragon

trap". This gave time to remove the knife and allowed for the imaginary play to continue. As identified by Ruth, "I just realised that you just do it [having control] in character. And it's fine" (Ruth - P010 H2 Ruth interview part 2).

Second, when teachers were in the imaginary situation, they were no longer the teacher but rather they became a play partner. The act of playing with the children brought with it a crisis for the teachers, as Ruth explains at the end of the educational experiment:

> When we were first asked to enter the play, of course you know what that means, but you don't know what it feels like. I think I had fears that I won't be very good at it, also as a teacher I could position myself as a professional, part of your job is behaviour management, so you are seen that way to the parents and the children, and all of a sudden you are going into this silly character, and I wasn't quite sure how to do it all (Ruth - P010 H1 Ruth interview part 1).

In the educational experiment the teachers' position changed as they experienced being play partners. The play role was originally viewed by them as a contradiction to their expected teacher role. In contrast with Lindqvist (1995), being characters in imaginary play brought with it a crisis. However, the successful resolution of this problem created motivating conditions for the teachers:

> Then we experienced the fun of it, how the children respond. Just having the confidence to know that the children enjoy you having a go. It's not about being perfect dramatization, it's about play and now I feel comfortable to do that (Ruth - P010 H1 Ruth interview part 1).

Third, the educational experiment with its focus on STEM concepts brought with it the new demands associated with the teachers feeling confident about their own understandings of STEM concepts.

> I still feel like I need to gain a bit more confidence with the scientific concepts and I felt like it was quite broad and we weren't sure where we were going because there was so many ideas that we wanted to work on and now I feel like we're sort of tightening that up a bit which gives me a bit of confidence in how we're going to go in terms of the playworlds with the children (Olivia).

We found that the new practices within the activity settings created new kinds of demands on the teachers, and these demands acted as a source for teacher development as the demands were successfully resolved.

Working on a theoretical problem created new psychological conditions for teachers

Teachers and researchers working collaboratively on a theoretical problem created new psychological conditions for the teachers as they brought to their everyday practices new concepts and different understandings about the same activity setting. Two key insights emerged.

First, we found that in working with concepts in the educational experiment that teachers developed their theoretical thinking in support of solving the theoretical problem. For instance, at the end of the two years Ruth explained her own development using Vygotsky's conception of the dialectical relations between everyday and scientific concept formation:

> If you haven't seen it [playworld], it's like with the children, they have to move from the everyday hands-on experience to the theorical, and they loop (signals with hands a recurring loop), and they feed each other. It's the same for us as learners. If you have not experienced it, given it a go, or seen it in practice, it's very hard. You've only got the theory. It's exactly the same thing. So, once you have had a go, read more theory, and you have another go, that's where my confidence has come from [as a teacher bringing concepts into children's play] (P010 H16 Ruth interview part 16).

Having theoretical resources, as is foundational for an educational experiment, gave the teachers tools for thinking and concepts for communicating. The educational experiment gave the possibility for teachers to pay attention to everyday and scientific concept formation of the children, but to also use these same theoretical concepts to talk about their own development as teachers.

Second, we found that the social situation of the play-based setting was understood differently as teachers met the demands of the educational experiment. This finding emerged early in the educational experiment because the teachers had an immediate memory of their original practices of an interest based program, where they followed the children's lead and only planned in situ as a response to what individual children said (child's voice); which was very different to the planning of a collective playworld and the intentional teaching of STEM concepts. A direct comparison was easily made, as was revealed in an interview after the first playworld (Alice in Wonderland) in the educational experiment. In this example below, subject positioning is used to explain the problem of the interest-based practice theoretically.

> [In an interest-based program] I was really finding that the pressure to document the child's voice was limiting my subject positioning with the children because I was in the below [position] and asking questions so that I could write answers in their words. Whereas now I'm stepping in more and perhaps giving them more – well I'm using a range of other strategies and tools (Ruth).

Within the same social situation of the activity setting, Ruth changed the practices from an interest-based program of observing and documenting to the new practice tradition of the playworld. Having new practices within the activity setting, and a new way of talking about her previous and her new interactions – subject positioning –brings forward new insights for her after one playworld. The theoretical problem that drove the educational experiment brought with it new ways of entering into the existing activity settings and theoretical ways of talking about previous practices.

Identification of foundational psychological content of an educational experiment

Overall it can be argued that the educational experiment created motivating conditions for the teachers over time and this contributed to teacher motive development. A change in teacher practices was brought about by particular kinds of psychological content in the educational experiment. Three points of evidence contributed to this finding.

First, we found that raw emotional engagement and theoretical conception of these emotional experiences of the playworld was an important outcome of the educational experiment. For instance, it was agreed that the story needed to be emotionally charged, as this gave an emotional investment for the children, but also the teachers.

> The main thing, 'cause I was reflecting on the project so far, it's been almost a term. I was thinking we are really focussing on science and engineering – but I realised, … the social and emotional aspects of this project is so important. We launched off the Lorax project so they had just investigated the concept of greed and fairness and then we went straight into Robin Hood and they latched onto those ideas – which I think they would have anyway because fairness for 4 and 5 year olds is important – "that's not fair" that's the language that they use. Because it is the social and emotional concepts that gives them to motive to want to solve the scientific problem (Ruth interview late period).

Second, we identified the importance of a collective motive for the concept or problem to be solved. This can be seen with how the teachers identified a collective motive as key for the problem in the story, as the following example from the final interview shows:

> We did have small problems like when Joe was lost in the forest and we had to help him home and know he was home. But it wasn't, it wasn't like an ongoing problem. This is a problem that we keep coming back to, that we're all connected. So it's that collective motive that was more for an episode as we're now calling them or a session it wasn't deep enough … for me and for the children maybe (Ruth interview second period).

Third we identified a doubleness of theoretical thought. That is, the development of children's theoretical thinking was mirrored with teacher theoretical thinking. The teachers supported the theoretical modelling of children, as the next example shows.

> Ruth: Sometimes I would pose a problem, and they would say, "No Ruth. This is just a model representing that [pointing]"
> Olivia: The process is paramount, and we value that. But the product is still important to show what has culminated from this (Planning period 3).

We identified that the teachers were engaged in theoretical thought as they made conscious the processes within the educational experiment of solving the problem of how to bring STEM concepts into children's play. A change in teacher positioning as an outsider of children's play, to a *play position* led to a change in teacher motives.

The examples illustrated in this section bring out how teachers used theoretical thought, the need for a collective motive (which included them), and an emotionally charged and dramatic problem to be solved, as the key characteristics for solving the theoretical problem of the educational experiment – which was how to bring STEM concepts into children's play?

Conclusion

The study reported in this paper focused on teacher development. It was identified that an educational experiment appeared to act as a source of development for teachers. We found that the psychological content of our educational experience brought forward the Vygotskian concepts of everyday and scientific concept formation, the social situation of development, and the concept of crisis. We also identified that Kravstov and Kravtsova's (2010) conception of subject positioning supported the teachers in dealing with changes in practices associated with how to bring concepts into the story, so they were personally meaningful to the children.

How the educational experiment created these conditions can be summarised as:

1. there were ongoing small crises that emerged within each period of the educational experiment, and these small crises collectively led to a developmental *change in the dominating motives of the teachers.*
2. teachers and researchers *working collaboratively on a theoretical problem created new psychological conditions* for the teachers as they brought to their everyday practices new concepts and different understandings about the same activity setting
3. change in teacher practices was brought about by the *psychological content in the educational experiment*

It is argued that when teachers are engaged in theoretical problems in an educational experiment, they enter the social situation of teaching differently because they draw on theoretical knowledge and thinking. The latter was found to be their new social situation of development as they conceptualised and generated different relational models to solve theoretically driven problems. The result was that teachers moved from an authority figure with an instructional position to being with the children in role play working towards a collective motive to solve problems that emerged in the play. The findings add to what is already known about teacher development and bring new insights into what cultural-historical concepts appear to contribute to the theorisation of development for teachers in play-based settings.

References

Davydov, V. V. (1990). *Types of generalization in instruction: Logial and psychological problems in the structuring of school curricula* (J. Teller, Trans.). National Council of Teachers of Mathematics.

Ebadi, S., & Gheisari, N. (2016). The role of consciousness-raising through critical reflection in teachers' professional development: A sociocultural perspective. *Cogent Education, 3*(1) https://doi.org/doi.org/10.1080/2331186X.2016.1147990

Edwards, A., Chan, J., & Tan, D. (2019). Motive orientation and the exercise of agency: Responding to recurrent demands in practices, In A. Edwards, M. Fleer and L. Bottcher (eds.). *Cultural-historical approaches to studying learning and development. Societal, Institutional and personal perspectives*, (pp. 201-214). Singapore: Springer Singapore. https://doi.org/10.1007/978-981-13-6826-4_13

Ellis, V, (2007). Taking subject knowledge seriously: from professional knowledge recipes to complex conceptualizations of teacher development. *The Curriculum Journal*, *18*(4), 447-462. https://doi.org/doi.org/10.1080/09585170701687902

Eun, B. (2008) Making connections: grounding professional development in the developmental theories of Vygotsky. *The Teacher Educator*, *43* (2), 134-155. https://doi.org/doi.org/10.1080/08878730701838934

Eun, B. (2011) A Vygotskian theory‐based professional development: implications for culturally diverse classrooms. *Professional Development in Education*, *37*(3), 319-333. https://doi.org/doi.org/10.1080/19415257.2010.527761

Fleer, M. (2011). Conceptual Play: Foregrounding imagination and cognition during concept formation in early years education. *Contemporary Issues in Early Childhood, 12*(3), 224-240.https://doi.org/doi.org/10.2304/ciec.2011.12.3.224

Grimmett, H. (2014). *The practice of teachers' professional development: A cultural-historical approach*. Sense Publishers.

Hakkarainen, P., Bredikyte, M., Jakkula, K., & Munter, H. (2013). Adult play guidance and children's play develop- ment in a narrative play-world. *European Early Child Education Research Journal, 21*(2), 213–225. https://doi.org/doi.org/10.1080/1350293X.2013.789189

Hedegaard, M. (2008). Developing a dialectic approach to researching children's development. In H. Marine & M. Fleer (Eds.), *Studying children: A cultural-historical approach* (pp. 30-45). Open University Press.

Hedegaard, M., and Chaiklin, S. (2005). *Radical-local teaching and learning, A cultural-historical approach*. Aarhus University Press.

Johnston, K., Hadley, F., & Waniganayake, M. (2020). Practitioner inquiry as a professional learning strategy to support technology integration in early learning centres: Building understanding through Rogoff's planes of analysis. *Professional Development in Education*, *46*(1), 49-64. https://doi.org/doi.org/10.1080/19415257.2019.1647871

Kravtsov, G.G. & Kravtsova, E.E. (2010). Play in L.S. Vygotsky's nonclassical psychology. J*ournal of Russian and East European Psychology, 48*(4) , 25–41.https://doi.org/doi.org/10.2753/RPO1061-0405480403

Lindqvist, G. (1995). The aesthetics of play : a didactic study of play and culture in preschools [Doctoral Thesis]. Uppsala University. Stockholm. Murphy, C., Scantlebury, K., & Milne, C. (2015). Using Vygotsky's zone of proximal development to propose and test an explanatory model for conceptualising coteaching in pre-service science teacher education. *Asia-Pacific Journal of Teacher Education*, *43*(4), 281-295. https://doi.org/doi.org/10.1080/1359866X.2015.1060291

Nuttall, J., Edwards, S., Mantilla, A., Grieshaber, S., & Wood, E. (2015). The role of motive objects in early childhood teacher development concerning children's digital play and play-based learning in early childhood curricula. *Professional Development in Education, 41*(2), 222-235. https://doi.org/10.1080/19415257.2014.990579

Tasker, T., Johnson, K.E. and Davis, T.S. (2010). A sociocultural analysis of teacher talk in inquiry-based professional development. *Language Teaching Research*, 14(2) 129–140.https://doi.org/doi.org/10.1177/1362168809353871

Vygotsky, L.S. (1987). *The collected works of L.S. Vygotsky. Problems of general psychology,*Vol 1, Tran. N. Minick. Editor of English Translation, R.W. Rieber, ad A.S. Carton, New York: Kluwer Academic and Plenum Publishers.

Vygotsky, L. S. (1997). The historical meaning of the crisis of psychology. In R. W. Rieber & J. Wollock (Eds.), *The collected works of L. S. Vygotsky: Problems of the theory and history of psychology* (Vol. 3, pp. 233–344). Plenum Press.

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