

Upper detail of Phillip's Economic Computer, the machine conceived by Bill Phillips (1914-1975), a New Zealand-born engineer turned economist. Phillips designed the machine to demonstrate in a visual way the circular flow of money within the economy. Approximately fourteen machines were built, and this particular machine was used as a teaching aid at the London School of Economics. It ran until May 1992. Side lit.

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MONIAC Computer

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The **MONIAC (Monetary National Income Analogue Computer)** also known as the **Phillips<sup>1</sup> Hydraulic Computer** and the **Financephalograph**, was created in 1949 by the New Zealand economist Bill Phillips (William Phillips) to model the national economic processes of the United Kingdom, while Phillips was a student at the London School of Economics (LSE), The MONIAC was an analogue computer which used fluidic logic to model the workings of an economy. The MONIAC name may have been suggested by an association of money and ENIAC, an early electronic digital computer.

#### Description

The MONIAC was approximately 2 m high, 1.2 m wide and almost 1 m deep, and consisted of a series of transparent plastic tanks and pipes which were fastened to a wooden board. Each tank represented some aspect of the UK national economy and the flow of money around the economy was illustrated by colored water. At the top of the board was a large tank called the treasury. Water (representing money) flowed from the treasury to other tanks representing the various ways in which a country could spend its money. For example, there were tanks for health and education. To increase spending on health care a tap could be opened to drain water from the treasury to the tank which represented health spending. Water then ran further down the model to other tanks, representing other interactions in the economy. Water could be pumped back to the

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<sup>1</sup> Named after Bill Phillips was an engineer from New Zealand, had acquired a severe nicotine addiction as a prisoner of war in a Japanese camp, where he had displayed both heroism and a genius for practical engineering — he risked his life by fashioning a tiny makeshift radio from bits he had pilfered from the camp commander's office, and built an immersion heater capable of providing 2000 starving fellow P.O.W.s with a cup of tea each night before bed. See also his contribution to economics in: *Leeson, R., ed. (2000) "A. W. H. Phillips: Collected Works in Contemporary Perspective."* Cambridge University Press, Cambridge, UK.

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treasury from some of the tanks to represent taxation. Changes in tax rates were modeled by increasing or decreasing pumping speeds.

Savings reduce the funds available to consumers and investment income increases those funds. The MONIAC showed this by draining water (savings) from the expenditure stream and by injecting water (investment income) into that stream. When the savings flow exceeds the investment flow, the level of water in the savings and investment tank (the surplus-balances tank) would rise to reflect the accumulated balance. When the investment flow exceeds the savings flow for any length of time, the surplus-balances tank would run dry. Import and export were represented by water draining from the model, and by additional water being poured into the model.

The actual flow of the water was automatically controlled through a series of floats, counterweights, electrodes and cords. When the level of water reached a certain level in a tank, pumps and drains would be activated. To their surprise, Phillips and his associate Walter Newlyn found that MONIAC could be calibrated to an accuracy of  $\pm 2\%$ .

The flow of water between the tanks was determined by economic principles and the settings for various parameters. Different economic parameters, such as tax rates and investment rates, could be entered by setting the valves which controlled the flow of water about the computer. Users could experiment with different settings and note the effect on the model. The MONIAC's ability to model the subtle interaction of a number of variables made it a powerful tool for its time.

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When a set of parameters resulted in a viable economy the model would stabilize and the results could be read from scales. The output from the computer could also be sent to a rudimentary plotter.

MONIAC had been designed to be used as a teaching aid but was discovered also to be an effective economic simulator. At the time that MONIAC was created, electronic digital computers that could run complex economic simulations were unavailable. In 1949 the few computers in existence were restricted to government and military use. Neither did they have adequate visual display facilities, so were unable to illustrate the operation of complex models. Observing the MONIAC in operation made it much easier for students to understand the interrelated processes of a national economy. The range of organizations that acquired a MONIAC showed that it was used in both capacities.

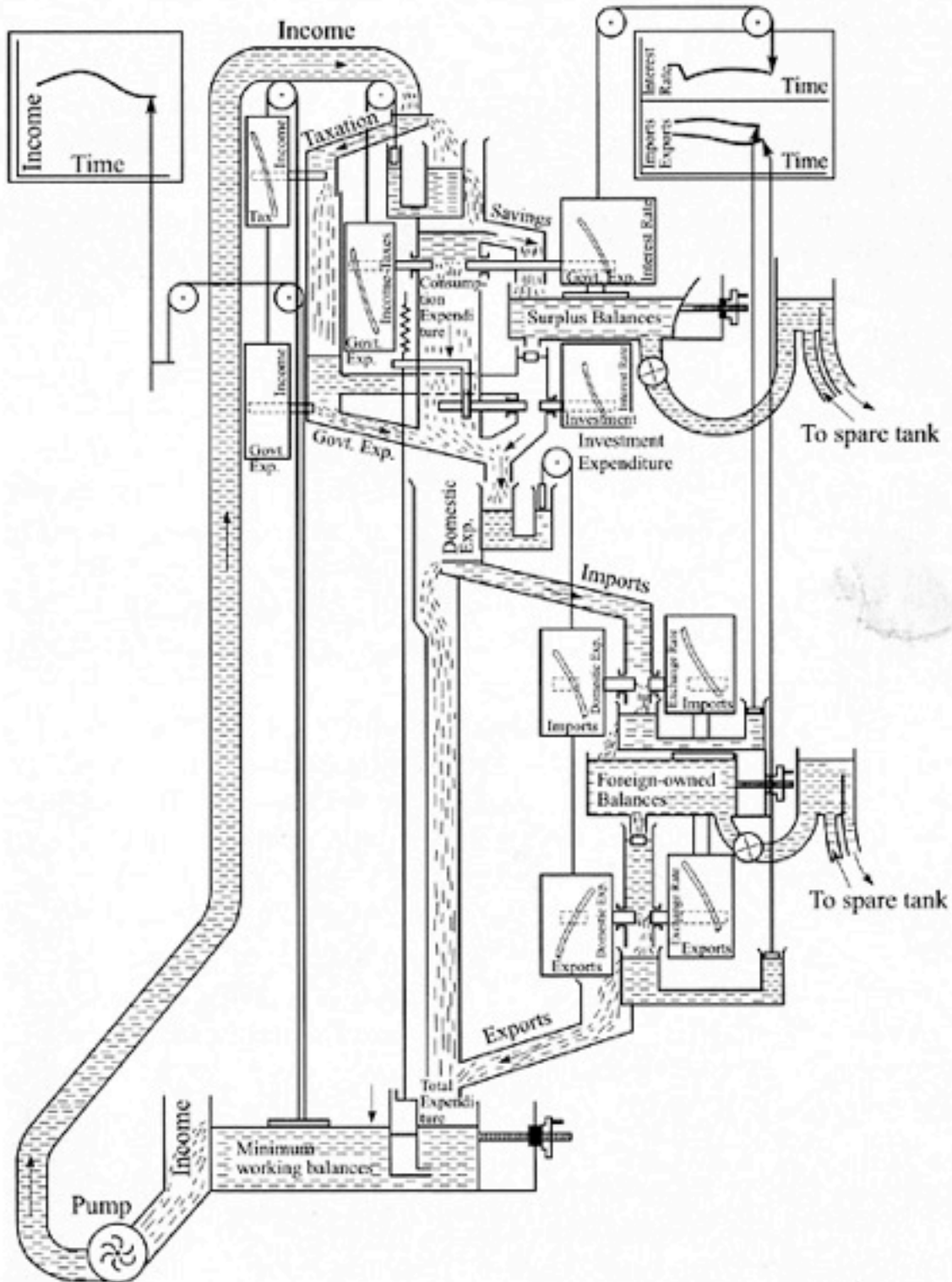
Phillips scrounged a variety of materials to create his prototype computer, including bits and pieces from war surplus such as parts from old Lancaster bombers. The first MONIAC was created in his landlady's garage in Croydon at a cost of £400.

Phillips first demonstrated the MONIAC to a number of leading economists at the LSE in 1949. It was very well received and Phillips was soon offered a teaching position at the LSE.<sup>2</sup>

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<sup>2</sup> wikipedia

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Schematic diagram of the Phillips machine in Barr, N. (2000) "The history of the Phillips machine," which appeared as Chapter 11 in Leeson, R., ed. (2000) "A. W. H.

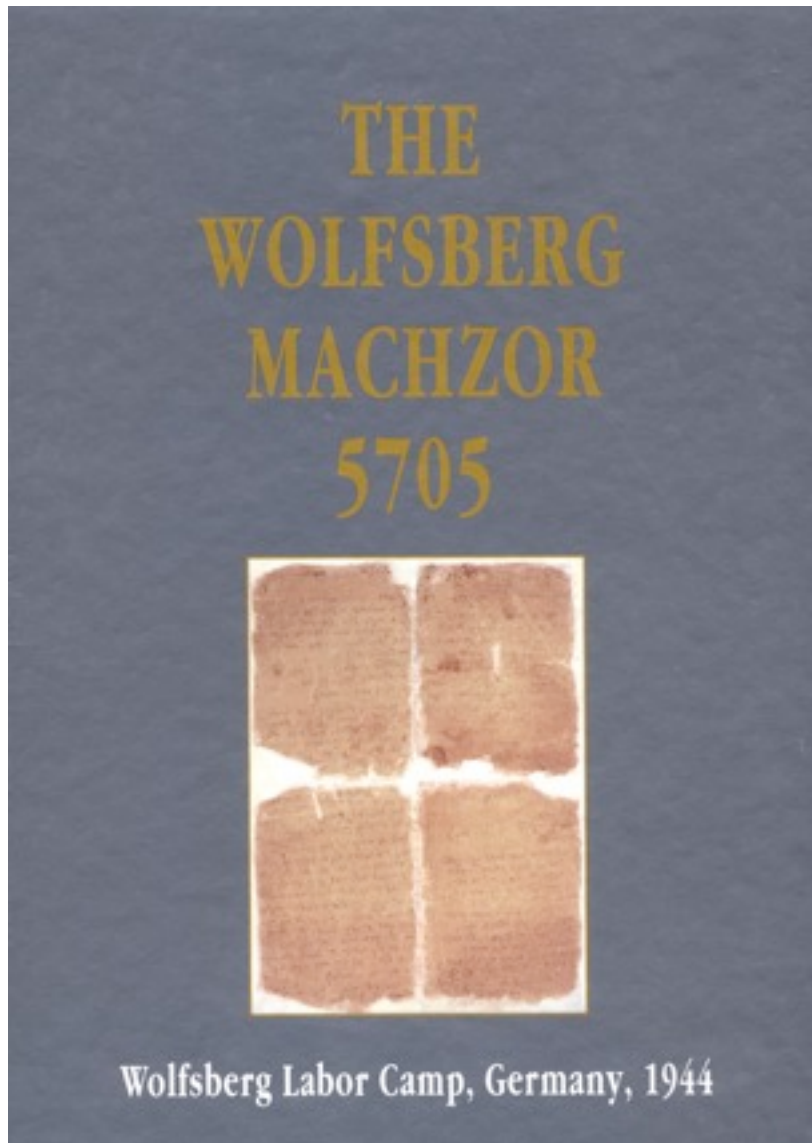
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*Phillips: Collected Works in Contemporary Perspective.* Cambridge University Press, Cambridge, UK.

In the front right corner, in a structure that resembles a large cupboard with a transparent front, stands a Rube Goldberg collection of tubes, tanks, valves, pumps and sluices. You could think of it as a hydraulic computer. Water flows through a series of clear pipes, mimicking the way that money flows through the economy. It lets you see (literally) what would happen if you lower tax rates or increase the money supply or whatever; just open a valve here or pull a lever there and the machine sloshes away, showing in real time how the water levels rise and fall in various tanks representing the growth in personal savings, tax revenue, and so on. This device was state of the art in the 1950s, but it looks hilarious now, with all its plumbing and noisy pumps.<sup>3</sup>

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<sup>3</sup> Steven Strogatz: <http://opinionator.blogs.nytimes.com/2009/06/02/guest-column-like-water-for-money/>



"Master of the world, You wrote in Your Holy Torah regarding Yom Kippur 'And you shall afflict your souls (Leviticus 23:27) and further You wrote "Take therefore good care of yourselves (Deuteronomy 4:15). My Creator and my Holy One, which of the two must I keep. If I continue the fast I will die and will not be able to complete the second Divine request. I want to fast but you are not letting me. You don't let me but I will nevertheless fast ... I may be rebelling against Your will but I pray that You will give me the strength to fight Your will."<sup>4</sup>

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<sup>4</sup> Prayer from Yom Kippur Liturgy Wolfsberg Concentration Camp 1944

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I was moved by the use of such a literal metaphor of the ingenious machine that opened so many minds to the workings of psychology in what was once considered the cold hard cause and effect world of money. The literal sculpture turned out to be the structure of a parable that explained the unconscious workings of the human mind in the complexity of the financial markets.

This machine allowed many many people to realize to what degree the unconscious moves in such overtly mechanistic workings of the ebb and flow of money and markets.

The next thought that occurred to me was how similar we view the workings of the divine. We appease, pray, cajole, make deals, flatter, praise and genuflect along with symbols, rituals, incense, sacrifices and churches and temples all making up what we called religion. All what we use in order to affect the flow of divine energy (spiritual water) to come down to use in a merciful rather than wrathful manner.

In Hassidut and Kabbalah I thought I might have escaped such mechanistic and literal (often hyper-literal) readings of texts, history and theology. However even here I have found a more than comfortable reliance on the study of the "plumbing" of the divine, as in Kabbalah and the Chabad masters. I saw at the kotel the Sefardi Mekubalim praying by basically sounding off the divine names as reformulated in the Amidah prayer of the siddur of the Rashash. It appeared as if they were merely sounding off the names without attention as if the divine could be tweaked through their recitations.

The essential element making up the sefirotic tree used by most kabbalists remains the historical move from the single line of 10 elements vertically arranged to the triune tree

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of three parallel vertical lines. This is one of the most dramatic changes in medieval Kabbalah.

The two sides of the triangular tree represent the divine mercy versus the divine judgement or stern anger. The function of the adept is to "sweeten the judgement" through acts of prayer and meditation. The tree is divided into three triangles superimposed upon each other, the top being mentation, the middle emotional and the lower vegetative or base functions and drives. The three triangles represent an architecture of hierarchical status upon which the layers of base instinct are controlled by the one above, the emotive and those by the mental/intellectual functions.

The various interactions of these layers and their respective roles in various rituals and prayers form the basis for many of the sermons and discourses of Chabad.

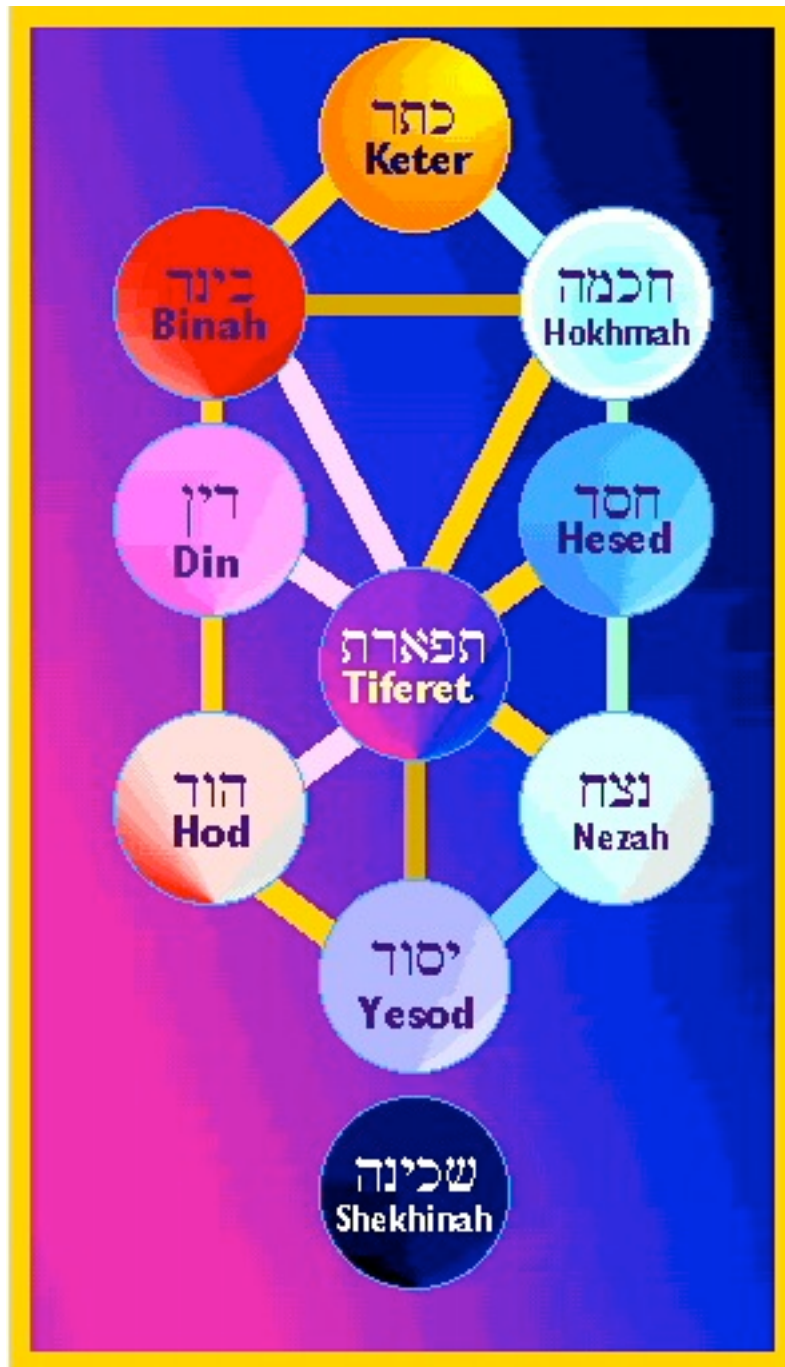
Th hassidic concepts are based on the Tree of Life going back to the Sefer yetzirah and Kabbalah and forms a road map for connecting with the divine as well as a mythic hologram for all reality in its fragmented form.

The critical structure of the map has two opposing forces on each side of a central core which balances the two forces. This central core runs from Keter on the top to Malchut on the bottom.

The adept must ascend and descend in his worship and ritual praxis this vertical road map. Recent scholars, however have taken a three dimensional view of this map.<sup>5</sup>

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<sup>5</sup> Leonora Leet: The Universal Kabbalah: Inner Traditions, 2004

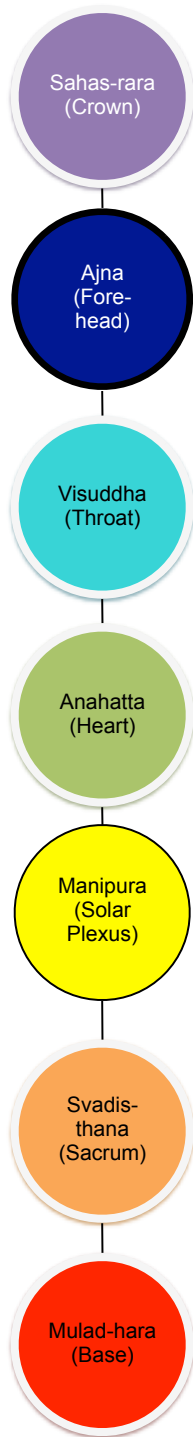


The two sides of the central line represent divine justice and stern judgement and divine mercy with the adept mystic attempting through his rituals and prayers to affect the divine efflux to the merciful side (known as *mittuk ha-din*).

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Other traditions have road maps to spirituality such as Tantra: The Hindu Contemplative

Tradition seen below:



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The notion of such a spiritual architecture is not unique to Kabbalah and other systems of theosophy have different diagrams and "plumbing" systems for connecting the divine and human realm. The tantric tradition above, has a vertical axis of hierarchical chakras or spiritual nodal points located in the human anthropos.

In discussing the relation between the divine and the human realms one cannot escape a discussion of the kabbalistic notion of Tzimtzum or divine contraction that somehow and paradoxically connects the infinite to the finite worlds.

[Tzimtzum](#) keeps on coming up for me as the single most poignant concept to connect the divine to this world in Kabbalah.

Tzimtzum, as we learn in the first chapter of (The ARI) Rabbi Luria's Eits Chaim, is how the world came into being.

*"In the beginning of everything, all of existence was unitary light called Ein Sof. There was no vacated or "empty" space. ... He contracted Himself from the midpoint of His light - to the sides and surroundings and empty space resulted between them".*

Here, Tzimtzum is defined as withdrawal. God had, so to speak, withdraw so that a space for independent creatures could come into being. Whether this withdrawal was actual, potential, or located solely within human perception is a question that is discussed by students of the Alter Rebbe of Chabad, The Mitteler Rebbe and Reb Aron of Starozewle. Other non-chassidic masters such as the Gaon and the Ramchal (Moshe Chaim Luzzatto) saw it more as one of divine providence. It is clear, however, that Tzimtzum is defined as withdrawal. It cannot be otherwise, for at this first step in Creation (or rather Emanation), nothing could have changed if not for a withdrawal.

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However, it is incorrect to think of Tzimtzum as a one time event. As with all myths, Tzimtzum is a basic mechanism of all stations of emanation and concealment of the divine. At every step of descent, the light must be lessened, for, coming from a higher level, it by definition is something that the lower level cannot perceive. As in myth the notion of withdrawal and emanation is one of revelation and concealment that continuously occurs in reality cycling back on itself in a circular rather than linear fashion.

*"All contractions lead to a decrease of the light so that the lower levels can receive it"*

Eits Chaim, Nekuddim, CH.2

"Tzimtzum" describes two very different phenomena. One is an actual withdrawal, to open up a "space", and the other is merely a diminishing of light, so as not to overwhelm.<sup>6</sup>

"As is well known, the manner in which the creation [began] is that, "at the outset, there was a sublime and simple light which filled all existence.... When it arose in His simple will to create the worlds, He contracted this light. There remained a space and an empty cavity. And afterwards, He extended one vector ..." as stated and explained in Torah Or, in the maamar entitled Patach Eliyahu, and in Likkutei Torah, in the maamar entitled Lehavin MasheKasuv BiOtzaros Chayim, and other sources.

In the further development of the idea there are subsequent acts of concealment after the initial creative divine act. There is a difference between this contraction (tzimtzum) and the subsequent tzimtzumim. For this [first] tzimtzum is characterized by withdrawal

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<sup>6</sup> This understanding is made explicit in the Lubavitcher Rebbe's sichos. See <http://www.sichosinenglish.org/books/letters-rebbe-1/91.htm>

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and not [merely] limitation. This makes it possible for the vector (kav) to be drawn down afterwards, i.e., light to be en-clothed in vessels. This allows for the worlds to exist.

However, even within Chabad there is another view. Basing himself on another unique principle of Chabad, that Tzimtzum took place only in terms of human perception but not in the Ein Sof Himself (Ohr, not Maor or Atsmus), Rabbi Yossi Ives explains Tzimtzum in the recently published Seder Hishtalshelus (London 2004).<sup>7</sup> In it on pp.35-45 he argues that all of Tzimtzum is of the second type, that of concealment of light, never a withdrawal. There are others who hold this view, for example Maor V'Shemesh in the beginning of Genesis and Ramchal (KLCH, 24). It is made explicit in Nefesh Hachaim 3:7.

Finally, there is Rabbi Nachman's opinion that all Tzimtzumim are withdrawals. There is radical corollary to this; since withdrawal leaves an empty space, there must be innumerable empty spaces in the fabric of emanation. The concentric spheres must not touch, for if they do, light from the higher level will flow in and overwhelm the light from a lower level. R. Arye Kaplan, basing himself on Rebbe Nachman's Likutei Mehoran 64:3<sup>8</sup> and a citation from Etiz Chaim (which, however, talks specifically of the initial Tzimtzum), writes in Inner Space<sup>9</sup>

*"Immediately light extended from all directions and created a round concentric sphere that filled the entire vacated space... and the concentric sphere vacated... The process of constriction and expansion continued until the Kav reached the center point and the*

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<sup>7</sup> See also his explanation in <http://www.sichosinenglish.org/books/letters-rebbe-1/04.htm>

<sup>8</sup> see my discussion on this topic of Likutei Mehoran elsewhere [www.drungar.com/theological essays](http://www.drungar.com/theological%20essays).

<sup>9</sup> Aryeh Kaplan Inner Space: Introduction to Kabbalah, Meditation and Prophecy, Moznayim Press 1990: 125

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*entire Vacated Space was filled with luminous universes, one within the other.. We might conjecture, however, that in between each of these concentric spheres there is a kind of no man's land, where God is completely hidden, and where one who does not know how to look would say that God is not there".<sup>10</sup>*

To restate, there are 3 views on Tzimtzum:

1.It is all concealment from human perception or, alternatively, diminishing of the brightness of Divine light as it falls from level to level - never a withdrawal.

2.It is always a withdrawal; consequently the world is full of dark spaces where God cannot be found.

3.The initial Tzimtzum was a withdrawal; all the subsequent ones were concealment.<sup>11</sup>

In this discussion one can appreciate how the various discussions regarding the connection between the divine and human realm has been parsed into components that have direct impact in a mythic way, on the whole approach of the mystic in connecting with the divine. For Chabad the accessing of the divine is possible precisely because of the theoretical structure and function of the light contracting then expanding. For Rebbe Nachman such access is not possible using a didactic or intellectual approach. In Lesson 64 he claims that only music can bridge the chasm between divine and human realms and even then it is only the Zaddik who is able to cross over the "vacated space" that spiritual vacuum left by the divine footprint.

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<sup>10</sup> See also TRSVav by Rebbe Rashab, beginning of Vayecholu Hashemaim.

<sup>11</sup> <http://www.avakesh.com/kabbala/page/4/>

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In post Holocaust world where there seems to be an apparent radical fracture between the human and the divine world, what rabbinic or kabbalistic myth is sufficient to explain and describe the new ontology? I had attempted to track a trajectory in my thesis<sup>12</sup> the rabbinic response to the catastrophe of the Hurban especially in the parables or *meshalim* of Lamentations Rabba Proems, in which the hidden protests encoded in these parables expressed the shock horror and outrage at the behavior of the king and by way of inference of the divine. In this trajectory what is being expressed in our time? The Piacetzna Rebbe in the Warsaw Ghetto in his Eish Kodesh<sup>13</sup> struggled with the notion of divine grace in the fury of the Nazi oppression with new concepts but was still unaware of the magnitude of the slaughter as he was deported in early 1943.

Can we plot a trajectory making use of kabbalistic metaphors of divine exile fracture and possible healing or Tikkun. David Weiss Halivni had used such a metaphor a couple of times in his recent book "Breaking the Tablets":

*According to Halivni, the withdrawal of the divine presence was not a sudden disappearance of God that took place only in the 20th century. Rather, Auschwitz was the tragic culmination of an ancient, dialectical process whose first instance was Moses' breaking of the tablets in response to the Israelites' worship of the golden calf. The second chapter of "Breaking the Tablets" — which returns to the central thesis of Halivni's most revolutionary book, "Revelation Restored" (1997) — provides a history of this dialectical process of God's revelations and vanishings, as reflected in the history of*

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<sup>12</sup> PhD Dissertation "Imaging/Imagining the Divine" Brandeis 2000, chapter 7

<sup>13</sup> Sacred Fire: Torah from the Years of Fury 1939-1942 [Paperback] Kalonymus Kalmish Shapira (Author), J. Hershy Worch (Translator) 2006

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*the losses during times of idolatry, and restorations in times of religious revival, of the canonical texts of Judaism, from Torah to Talmud.*

*The ontological absence of God during the Holocaust was, in other words, preceded by a long history of eclipses of God's will from what Orthodox Jews fervently believe to be Judaism's immaculate, revealed sacred texts, both divine and rabbinic. Halivni's most scholarly and original contributions to talmudical studies point to the many "bumps and fissures" in Jewish sacred literature and as such have served, quite deliberately, to undermine the religious authoritarianism and maximal claims to access to divine wisdom on the part of the experts in these very texts, namely, the rabbis.<sup>14</sup>*

In this magisterial work we have a notion of the "hiding of the face" of God or *hester panim*, a familiar trope in rabbinic literature however in other writings he has resorted to kabbalistic notions of *sh'virah* and *tikkun*. Apparently for this world renowned talmudic scholar all the philosophical rationales failed before the power of the tremendum. He needed to resort to kabbalistic metaphors despite his never having picked up the Noam Elimelech since childhood!

*Sh'virah* and *tikkun* are tropes that form part of a complex interaction of myth as described well by Rachel Elijor:

*The kabbalistic tradition took shape within the Jewish world in the wake of a profound crisis. Beginning with the destruction wreaked by the Crusades at the end of the 13th century and continuing with the blood libels and expulsions of Jews throughout Europe during the 14th and 15th centuries, the crisis culminated with the expulsion from Spain and Portugal during the final decade of the 15th century. The harsh reality that confronted the Jews was one of religious hostility, persecution, destruction,*

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<sup>14</sup> Breaking the Tablets: Jewish Theology after the Shoah. Review by Alan Nadler in <http://www.forward.com/articles/13553/#ixzz1NkJEeIN4>

*hopelessness, and discontinuity in an ongoing exile whose end was nowhere in sight. The kabbalistic tradition offered an entirely new perception of history embedded in meta-history; it changed the interrelationship of God and man, as well as the relations among past, present, and future. Kabbalah saw the divinity as an ongoing, dynamic process with a meta-historical purpose and direction; its goal was the transition from exile to redemption, and it saw man as playing a decisive role in that transformative process. The Kabbalah proposed a new creation narrative, one that gave new meaning to God's presence in the world and man's role there, while formulating a new language that explained the ongoing relation between the infinite and the finite and between God and man. The new creation narrative encompassed the dialectical concepts of overflowing, infinite bounty (shefa) and finite contraction (tzimtzum); the infinite expansion and the limiting withdrawal; and the outcome of this tension: breakage (shevirah) or "breaking of the vessels" (shevirat ha-keilim) and restoration (tikkun). All these concepts (shefa; tzimtzum; shevirah, shevirat ha-keilim) were part of the divine process of creation that preceded the creation of our "broken" world, a world whose fundamental essence is in exile. Only the last concept, that of tikkun — restoration of the broken world — was entrusted to the hands and mind of human beings.<sup>15</sup>*

In a post Holocaust world can Weiss Halivni's resorting to these tropes do sufficient justice to the memory of the dead and the allow us the luxury of an ongoing relationship with the divine? If Tikkun is entrusted to the hands and mind of human beings we too have failed in this myth. The theory of Tzimtzum was a way to explain the very paradox of the interaction between the divine and the human in exile.

*Originally, the theory of tzimtzum was a way to explain the inner meaning of exile beyond its existential torments. The very process of withdrawal into the innermost parts of the divinity and the ensuing emanation into the created void, which had culminated in the catastrophic "breaking of the vessels" (shevirat ha-keilim), signified that nothing is in its right place in heaven or on earth, i.e., everything is in exile. The kabbalistic tradition concluded from the theory of contraction and withdrawal that a process of mending and restoration had to take place in heaven and on earth. The human role had changed profoundly, because the passage from exile to redemption is dependent entirely on the*

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<sup>15</sup> Tzimtzum: A Kabbalistic Approach to Creation, Rachel Elijor, Sh'ma- [www.shma.com](http://www.shma.com)

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*passage from "the broken" to "the restored," or from the unjust world as it is known to us after the "breaking of the vessels," to the world as it ought to be in its ideal, just order. The theory of tzimtzum thus delineated the gap between, on the one hand, exile/ enslavement/ persecution/ separation/ injustice / coercion/ silence/ "broken world" and, on the other hand, redemption/ freedom/ equality/ unification/ benevolence/ "world of speech"/ justice/ "restituted reality." At the same time, it instructed the mystical way of thinking, focusing on the divine ideal order and emphasizing deveikut (thinking of, adhering to, and bonding with the divine presence) and kavannot ve-yihudim (intentions and unifications, that is, a focus on the symbols of the divine ideals of the just world). These mechanisms for hastening the passage from exile to redemption were the contribution of the theory of tzimtzum to Jewish thought and to the history of freedom.*

Again I question the moral values of explaining the death and torture of a million and a half babies in the Holocaust for the sake of ANY redemption. The notion of redemption at the expense of human suffering turns the metaphor on its head.

Rebbe Nachman felt the chasm in the *chalal hapanui* the absence of the felt presence of the divine. We return to his teaching in Lesson 64 and the paradoxical nature of a spirituality in the felt absence of the divine. Nothing approaches the depth of God's absence as what was experienced 70 years ago so a theology must address this experience.

Back to Phillip's machine where the metaphor of the machine as a possible explanation of the hidden workings of the market moved me to think of the metaphor of the Tree of Life and other maps to spiritual reality.

In the end all fall short. The financial markets remain refractory to rational analysis and the mythical explanations fall short in explaining the divine human relationship.

Once more we confront the silence of the world beyond. We feel the silence of the last survivors and the absence of their message and prayers in touching us.

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The prayers of the inmates at Wolfsberg Yom Kippur 1944 haunt us, they force us to confront our own absent faith and our tormented silence.