



12 July, 2011

| | |
|------------|--|
| Article 1. | The Financial Times <u>It's time to park the peace process</u> Gideon Rachman |
| Article 2. | The National Interest <u>Abbas's Breaking Point</u> Ilan Berman |
| Article 3. | NYT <u>Bad Borders, Good Neighbors</u> Ephraim Sneh |
| Article 4. | Center for Strategic and International Studies <u>Cyber Attacks, Real or Imagined, and Cyber War</u> James Andrew Lewis |
| Article 5. | Foreign Policy <u>The next U.S.-Russia missile race</u> David E. Hoffman |
| Article 6. | The Guardian <u>Do humans have a role in the robot wars of the future?</u> Barbara Ehrenreich |
| Article 7. | NYT <u>In Search of a Robot More Like Us</u> John Markoff |

Article 1.

The Financial Times

It's time to park the peace process

Gideon Rachman

July 11, 2011 -- A lot has changed in the Middle East since the Arab uprisings began. But one thing that remains constant is the obsession of international diplomats with the Israeli-Palestinian "peace process". Monday saw yet another effort to drag the unwilling parties back to the negotiating table. A meeting of the Quartet (the US, the UN, the European Union and Russia), held in Washington, was expected to call for talks to restart, as a matter of urgency.

Nobody seems minded to point out an obvious fact. With the Middle East in turmoil, starting a new round of Israeli-Palestinian talks is completely pointless.

Speaking last week Catherine Ashton, the EU's foreign policy chief, made the opposite case, listing several reasons why she thinks it crucial to start talks. Reason number one was "changes in the surrounding neighbourhood" – which seems a rather mild description for revolutions in Egypt and Tunisia, civil wars in Syria and Libya, and the destabilisation of Arab states from Morocco to Saudi Arabia. In fact, it is precisely the "changes in the surrounding neighbourhood" that make it a bad idea to waste precious energy on a peace process that is now a sideshow.

Some European diplomats cling to the idea that the Palestinian issue remains at the heart of the instability in the Middle East. But that is a theological position that can only be upheld by resolutely ignoring actual events. If there is one thing that the uprisings across the Middle East have in common, it is that they have very little to do with the Palestinians. What is more, despite the eager predictions of

many outside analysts, the occupied Palestinians territories have not (so far) exploded into Egyptian-style insurrection.

The main bearing that the Arab spring has had on the Palestinian issue is to change the calculations of both sides to the conflict, in ways that make them even less likely to risk negotiating a peace settlement.

At a time when Arab leaders everywhere are under attack for being remote, corrupt and elitist, it is simply too risky for the leadership of Fatah, the Palestinian faction in control of the West Bank, to enter into tortuous negotiations with the Israelis that will inevitably lead to accusations that they are selling out their own people. For the moment, the Palestinians seem much more interested in trying to reconcile Fatah and Hamas – and in pursuing the possibility of recognition of a Palestinian state at the UN General Assembly in September.

The Israelis are also in a defensive crouch. Israel's regional policy was built around a peace treaty with Egypt, cordial relations with Turkey, a cold peace with Syria and a shared interest with Saudi Arabia in the containment of Iran. The upheavals across the Middle East raise questions about the durability of all of these arrangements – which make it highly unlikely that the Israeli government will take any further risks by pulling troops out of the West Bank.

There is, of course, real doubt about whether the current Israeli government actually has a genuine interest in trading “land for peace”. But even an Israeli government that was completely committed to the idea of a “two-state solution” would hesitate to take any long-term decisions in such a rapidly-changing environment.

One of the great potential rewards for the Israelis of an eventual peace deal with the Palestinians is the prospect that it will lead to a permanent peace with the wider Arab world. But with almost all of the Arab regimes tottering, Israel could have no guarantee that such a

peace would last. There are also certain practical difficulties. Any peace with Syria would involve Israel handing back the occupied Golan Heights – but the government of Bashar al-Assad is otherwise engaged, right now.

Rather than waste time trying to pursue a final peace settlement, the “international community” should set more modest goals. The key point, at the moment, should be to try to stop either side from doing things that make a future peace deal actually impossible.

When it comes to the Palestinians, that means continuing to put pressure on Hamas to recognise the state of Israel. Without that, it is hard to see the Israelis agreeing to start talks. As far as Israel is concerned, the US and Europe should take a much harder line on Israeli settlements in the occupied territories that continue to eat into the land of a future Palestinian state. In an ideal world, the Obama administration would cut aid to Israel every time a settlement was expanded. Instead, Congress is currently waving the financial big stick in the wrong direction, at the Palestinians – for having the temerity to pursue their UN bid in September. Yet Israeli and Congressional hostility to the Palestinian charge at the UN is overdone. A General Assembly resolution without Security Council backing would change very little, legally or politically.

Still, the Americans and the Europeans do not relish the idea of being put on the spot at the UN. That might explain their eagerness to get talks started again. The plan seems to be to start a pointless peace process, in the hope of averting a meaningless UN declaration. Meanwhile, the real action in the Middle East is going on in Egypt, Libya, Syria and the Gulf. Until the outcome of those dramas becomes much clearer, trying to force progress on the Palestinian question is a futile displacement activity.

Article 2.

The National Interest

Abbas's Breaking Point

Ilan Berman

July 11, 2011 -- What could Mahmoud Abbas be thinking? The soft-spoken Palestinian Authority president, now in his seventh year in office, has never been known for the kind of political brinksmanship that characterized the rule of his predecessor, PLO leader Yassir Arafat. And yet, recent months have seen Abbas's government make a pair of deeply provocative moves, with potentially catastrophic consequences for Palestinian prosperity, as well as for prospects of a lasting peace with Israel.

The first was its plan, floated in earnest this spring by a number of Palestinian Authority officials, to forge ahead with a unilateral declaration of statehood this fall. Now, the idea of a Palestinian state is neither new nor controversial; indeed, a "two-state solution" is the logical terminus of the Israeli-Palestinian peace process begun in Oslo, Norway in 1993. But the belief that such a political reality can be created unilaterally is both. It undermines the long-running dialogue between Israelis and Palestinians, and the role of the United States as its facilitator. It also calls into question the fate of a series of so-called "final-status" issues (like final borders, sovereignty over Jerusalem, water rights and the Palestinian "right of return") that require bilateral consensus in order to be truly settled.

That Abbas's government has chosen to pursue such an option, therefore, seems more the product of frustration than of long-term strategy. The Palestinian Authority chairman said as much in a recent interview with Newsweek, in which he griped about a lack of support from Washington for his efforts to erect a Palestinian state. The resulting logic is clear: if statehood is too difficult to attain via drawn-

out negotiations, it might be accomplished by simply making it a fait accompli.

But betting a Palestinian state can be created in this fashion is an exceedingly risky gamble. The idea is bound to get a sympathetic hearing at the United Nations General Assembly, where the so-called "Arab bloc" of the Palestinian Authority's Middle Eastern allies has a considerable voice, when it convenes this September. But it is highly unlikely to pass muster with the Security Council, the UN's highest authority. That is because the United States, which holds a permanent seat on the Security Council and wields veto power over any resolution presented before it, has already made clear that it believes statehood must come about as a product of bilateral agreement rather than unilateral decree. And without Washington's endorsement and support, substantive Palestinian statehood will be slow in coming. If, indeed, it comes at all. The current political conditions in the West Bank and Gaza Strip dramatically reduce the possibility that the international community might see the creation of a Palestinian state as anything resembling a good idea. In late April, Abbas's ruling Fatah faction unexpectedly signed a "unity" deal with Hamas, the Palestinian Authority's main Islamist movement, bringing the latter into the political fold and making it a key partner in future governance. While working out the kinks of this arrangement has proven harder than originally envisioned, it is already clear that the marriage of convenience between the secular PLO and its radical religious opposition will have potentially catastrophic consequences. For one thing, it makes the idea of renewed negotiations with Israel—the real path to a two-state solution—a virtual non-starter. While his government remains willing to make far-reaching concessions in pursuit of peace, Israel simply "will not negotiate with a Palestinian government backed by the Palestinian version of Al Qaeda," Prime

Minister Benjamin Netanyahu made clear in his May address to Congress.

For another, it is bound to complicate the international support so crucial for Palestinian legitimacy. In his back-to-back speeches on Mideast policy this spring, President Obama used his considerable powers of persuasion to urge a re-start of the moribund Israeli-Palestinian peace process. But the stubborn reality that at least one part of the new, hybrid Palestinian government is committed to Israel's destruction is sure to frustrate those plans. So will Congress, where lawmakers from both political parties have condemned the Hamas-Fatah merger and threatened to cut off American aid to Abbas's government if it doesn't break with its new political partner. Even Europe, which historically has waxed sympathetic to the Palestinian cause, is likely to remain divided over support for Palestinian statehood absent serious revisions to the "unity" government.

None of which necessarily means that Abbas and company will back away from their bid to unilaterally establish "Palestine," or their ill-conceived partnership with Hamas. But it does make the prospects for real, lasting prosperity for the inhabitants of the West Bank and Gaza Strip more distant than ever. For that, the Palestinians have only their leaders to blame.

Ilan Berman is Vice President of the American Foreign Policy Council in Washington, DC. An expert on regional security in the Middle East, Central Asia, and the Russian Federation, he has consulted for both the U.S. Central Intelligence Agency and the U.S. Department of Defense.

Article 3.

NYT

Bad Borders, Good Neighbors

Ephraim Sneh

July 10, 2011 -- TODAY, as American, European, Russian and United Nations officials meet in Washington to discuss the future of the Middle East peace process, Israel's prime minister, Benjamin Netanyahu, remains adamant that a peace deal premised on returning to Israel's pre-1967 borders poses an unacceptable risk to its security. He is right: the country's 1967 borders are not militarily defensible. But his use of this argument to reject the only viable formula for Israeli-Palestinian peace — a negotiated two-state solution based on mutually agreed upon land swaps — is wrong, and it does not serve Israel's security interests. Israel needs peace with the Palestinians, and that will likely require a return to the 1967 lines with a few adjustments. These borders can be made defensible if they come with a security package consisting of a joint Israeli-Palestinian security force along the West Bank's border with Jordan, a demilitarized Palestinian state and a three-way Israeli-Jordanian-Palestinian defense treaty. Combined with such a package, the balanced formula President Obama outlined in his May 19 speech can give Israel the security it needs and deserves. Until June 1967, Israelis feared that a swift Arab military move could cut Israel in two at its "narrow waist" — an area near the city of Netanya, where the country is less than 10 miles wide. By doing so, Arab tanks and artillery could have reached Tel Aviv within a few hours. In the 44 years since, the geography has not changed, but the threat has. Today, there is a new menace that we did not face in 1967. Short- and medium-range rockets, mortars and missiles supplied by Iran are making the lives of Israeli civilians a nightmare. Thousands of these rockets have been launched from Gaza

into Israeli towns and villages since Hamas wrested control of Gaza in 2007; and if an independent Palestine emerges on the West Bank, these weapons could find their way there, too.

That is why the border between the West Bank and Jordan must be made impenetrable. This cannot be done remotely, from the 1967 lines; it will require a joint Israeli-Palestinian military presence along the Jordan River. Such joint military activity would not violate Palestinian sovereignty and could be modeled on Israel's current coordination with Palestinian security forces in the West Bank. It would be far more effective than deploying an international force. After all, United Nations forces in southern Lebanon have failed to prevent a colossal military build-up by Hezbollah since Israel withdrew from the area in 2000. Second, the Palestinian state must be demilitarized. No tanks, artillery or missiles can be deployed within its boundaries. In the absence of this weaponry, international guarantees will ensure Palestine's security and territorial integrity. Third, an Israeli-Jordanian-Palestinian defense treaty is necessary to safeguard their common strategic interests. Joint military planning and sharing early warning systems to prevent threats from Iran, its proxies and other jihadist forces in the region would cement this treaty. This security package would make the 1967 borders defensible, and keep Palestine from becoming another launching pad for terror. Moreover, an Israeli-Palestinian agreement would bring about a dramatic, strategic change in the Middle East. It would remove the obstacle preventing moderates in the region from uniting against militant Islamist extremists and lay the groundwork for a new strategic alliance in the region, including the Persian Gulf countries, which are natural business partners for Israel, Jordan and Palestine. As a result, Israel would be able to extend its hand to new democratic and secular governments in the Arab and Muslim world. And those

committed to Israel's destruction would be confronted by a new alliance with enormous economic and military power.

I have devoted more than three decades of my life to defending Israel, from the Litani River in Lebanon to the western bank of the Suez Canal in Egypt, and I would never support irresponsible, hazardous solutions to Israel's security problems. I don't believe durable peace in the region is possible unless Israel remains the strongest military power between Tehran and Casablanca.

We have no choice but to protect ourselves in a perilous world of aggressive Islamist fanatics and complacent, confrontation-averse Western democracies. But nurturing settlements in the West Bank and maintaining an occupation in order to protect them is not the proper way to do it.

Following that path will lead to disaster. Israel could become a binational state of first- and second-class citizens at war with each other; a third Intifada could break out, damaging Israel's economy and destroying Palestine's nascent infrastructure; or the pro-negotiation policy of the Palestinian president, Mahmoud Abbas, could collapse, allowing Hamas to take power in the West Bank. If this happens, the doomsday prophecy of rockets raining down on Ben-Gurion International Airport just might be fulfilled.

To avoid this fate, we must embrace the proposals of our American friends, end this conflict and allow Israel to become an active member, rather than an isolated actor, in the rapidly changing Middle East.

Ephraim Sneh, a retired general in the Israel Defense Forces, was Israel's deputy minister of defense from 1999 to 2001 and from 2006 to 2007.

Article 4.

Center for Strategic and International Studies

Cyber Attacks, Real or Imagined, and Cyber War

James Andrew Lewis

Jul 11, 2011 -- Assorted “cyber attacks” have attracted much attention in the past few months. One headline in this genre recently proclaimed “Anonymous Declares War on Orlando.” This is wrong on so many levels that it almost defies analysis. A more precise accounting would show that there have been no cyber wars and perhaps two or three cyber attacks since the Internet first appeared. The most ironic example of hyperbole catching itself involves the new Department of Defense Cyber Strategy, which says that the United States reserves the right to use military force in response to a cyber attack. Since many reports call everything—pranks, embarrassing leaks, fraud, bank robbery, and espionage—a cyber attack, the strategy led to expressions of concern that the United States would be shooting missiles at annoying teenage hackers or starting wars over Wikileaks. In fact, the strategy sets a very high threshold that is derived from the laws of armed conflict for defining a cyber attack. Nothing we have seen this year would qualify as an attack using this threshold.

Only by adopting an exceptionally elastic definition of cyber attack can we say they are frequent. There have been many annoyances, much crime, and rampant spying, but the only incidents that have caused physical damage or disruption to critical services are the alleged Israeli use of cyber attack to disrupt Syrian air defenses and the Stuxnet attacks against Iran’s nuclear facilities. An extortion attempt in Brazil against a public utility may have backfired and

temporarily disrupted electrical service. A better way to identify an attack is to rely on “equivalence,” where we judge whether a cyber exploit is an attack by asking if it led to physical damage or casualties. No damage, no casualties, means no attack.

Many militaries are developing attack capabilities, but this is not some revolutionary and immensely destructive new form of warfare that any random citizen or hacker can engage in at will. Nations are afraid of cyber war and are careful to stay below the threshold of what could be considered under international law the use of force or an act of war. Crime, even if state sponsored, does not justify a military response. Countries do not go to war over espionage. There is intense hostile activity in cyberspace, but it stays below the threshold of attack.

The denial-of-service efforts against Estonian and Georgian websites in 2007 and 2008 were not attacks. The Estonian incident had a clear coercive purpose, and it is worth considering whether the denial-of-service exploit against Estonia could have become the equivalent of an attack if it had been extended in scope and duration. The exploits against Georgia, while undertaken with coercive intent and closely coordinated with Russian military activities (and a useful indicator of how Russia will use cyber warfare), did no damage other than to deface government websites.

The recent escapades involving groups like Anonymous or Lulzsec do not qualify as attacks. Anonymous and Lulzsec did not disrupt critical operations of the companies or agencies they struck. There was embarrassment, but no damage, destruction, or casualties. These were political actions—cyber demonstrations and graffiti—spun up by media attention and copycatting.

Some nations—Russia in particular—argue that political actions are in fact the core of the new kind of warfare, and the issue is really “information warfare” rather than “cyber warfare.” They have said

that information is a weapon and that the United States will exploit the Internet to destabilize governments it opposes. Information is a threat to authoritarian regimes, and they want to limit access to websites and social networks. This effort to extend cyber attack to include access to information, however, makes little sense. It distorts long-standing ideas on warfare and military action by disconnecting them from the concept of the use of armed force and violence. The use of force produces immediate physical harm and is central to defining attack and warfare. The concept is incorporated in elements of the UN Charter and the Hague and Geneva Conventions. Publishing or sharing an idea is not the use of force. Though an expanded definition of warfare may serve the political interests of authoritarian regimes, it is not an accurate description of military action or attack.

There are countries that could launch damaging cyber attacks. At least 5 militaries have advanced cyber-attack capabilities, and at least another 30 countries intend to acquire them. These high-end opponents have the resources and skills to overcome most defenses. Just as only a few countries had aircraft in 1914 but most militaries had acquired them 10 years later, every military will eventually acquire some level of cyber-attack capability. Cyber attacks will likely be used only in combination with other military actions, but they will be part of any future conflict. We can regard them as another weapons system with both tactical and strategic uses, similar to missiles or aircraft that can be launched from a distance and strike rapidly at a target.

Stuxnet, for example, was a “military grade” cyber exploit and a precisely targeted alternative to an airstrike on Iranian nuclear facilities. It did less damage than an air attack but avoided distressing photos of burning buildings and claims of civilian casualties. The political effect on the Iranian people was negligible, while an airstrike

would have prompted an emotional reaction. Military planners now have an additional system to consider in their portfolio of weapons and attacks, which offers a new and attractive combination of effect and risk.

The Aurora test at the Idaho National Labs and the Stuxnet worm show that cyber attacks are capable of doing physical damage. Leading cyber powers have carried out network reconnaissance against critical infrastructure in preparation for such attacks. But these infrastructure are the most dangerous form of attack, and therefore hold the most risk for the attacker. At the onset of conflict, attacks that seek to disrupt and confuse are more likely than infrastructure attacks. Cyber warfare will begin with the disruption of crucial networks and data and seek to create uncertainty and doubt among opposing commanders. The goal will be to increase the Clausewitzian “fog of war.” This “informational” aspect of cyber war, where an opponent might scramble or erase data or insert false information to mislead an opponent, is a new and powerful military tool.

The Battle of Britain is a historical example of this kind of warfare. If the Germans had first destroyed the relatively simple network of sensors, control facilities, and communications systems used by Royal Air Force Fighter Command to maneuver defending aircraft, it would have seriously degraded British air capabilities and made ultimate success much more likely. They did not because they did not fully realize how warfare had changed to emphasize the importance of these intangible assets. Exploiting signals, data, and communications had become essential for military superiority. Future warfare between advanced opponents will begin with efforts to degrade command and control, manipulate opponent data, and misinform and confuse commanders (accompanied by electronic warfare actions, along with kinetic strikes on communications

networks and perhaps satellites). Cyber exploits will be the opening salvo and a short-notice warning of impending kinetic attack.

Strikes on critical infrastructure carry a higher degree of risk for the attacker if they are used against targets outside the theater of military operations or in the opponent's homeland. An attack on the networks of a deployed military force is to be expected. Attacks on civilian targets in the opponent's homeland are another matter and may escalate any conflict. Military planning will need to consider when it is beneficial to launch cyber attacks that damage critical infrastructure in order to strain and distract the opposing political leadership, and when it is better to limit any cyber strikes to military targets in theater.

This is one area where cyber attack, because of its global reach, may resemble nuclear war. Just as the U.S. Single Integrated Operations Plan and other documents listed and prioritized targets for nuclear weapons, based on satellite and other forms of reconnaissance, an astute cyber planner will identify and prioritize targets for cyber strikes under different conflict scenarios.

A full-blown, no-holds-barred cyber attack against critical infrastructure and networks might be able to reproduce the damage wrought by Hurricane Katrina, with crucial services knocked out and regional economic activity severely curtailed. While Katrina brought immense suffering and hardship, it did not degrade U.S. military capabilities and would not have led to a U.S. defeat. Multiple, simultaneous Katrinas would still not guarantee victory and could risk being seen as an existential threat that would justify a harsh kinetic response. There are many examples of militaries attacking targets that were irrelevant to success and only inflamed the opponent, so we cannot rule out such attacks (which could be very appealing to terrorist groups, should they ever acquire the ability to launch them), but no one should believe that this is a decisive new

weapon. The only “decisive” weapons ever developed were nuclear weapons, and even then, many would have been needed to overcome an opponent.

Pure cyber war—“keyboard versus keyboard” or “geek versus geek”—is unlikely. Cyber attacks are fast, cheap, and moderately destructive, but no one would plan to fight using only cyber weapons. They are not destructive enough to damage an opponent’s will and capacity to resist. Cyber attacks will not be decisive, particularly against a large and powerful opponent. The threat of retaliation that is limited to a cyber response may also not be very compelling. Cyber attack is not much of a deterrent.

Deterrence uses the implied threat of a damaging military response to keep an opponent from attacking. “Cross-domain” deterrence (where a cyber attack could result in a kinetic response) works at some levels—no nation would launch a cyber-only attack against the United States because of the threat of retaliation. But deterrence does not stop espionage or crime because these actions do not justify the use of military force in response. Since our opponents stay below the threshold of war, this limits what we can “deter.”

In the future, even this limited deterrence may not work against terrorist groups or irresponsible nations like Iran or North Korea. For nonstate actors, such as terrorists, it is hard to make a credible threat, since they lack cities and infrastructure to hold hostage and can be willing to commit suicide in an attack. Nations such as Iran and North Korea may have a very different calculation of acceptable risk, being willing to do things that strike other nations as insanely risky (as when North Korea torpedoed a South Korean patrol boat). Iran, North Korea, and others may miscalculate the reactions of the West to a limited cyber attack. When these less deterrable actors acquire advanced cyber capabilities, the likelihood of cyber attack will increase.

A century ago, armies discovered that technology could be the key to victory. Since then there has been a steady stream of new weapons, new technologies, and new ways to attack. Perhaps it is best to see the Internet and cyber attack as the latest in a long line of technologies that have changed warfare and provided new military capabilities. We have only begun to explore the uses of this new capability, and as the world becomes more dependent on networks and computer technology, the value and effect of cyber attack will grow.

James Andrew Lewis is a senior fellow and director of the Technology and Public Policy Program at the Center for Strategic and International Studies in Washington, D.C.

Article 5.

Foreign Policy

The next U.S.-Russia missile race

David E. Hoffman

July 11, 2011 -- Only two countries on Earth possess thousands of nuclear warheads: the United States and Russia. Together, they account for 95 percent of the existing 20,500 weapons; no other nation has more than a few hundred. Despite the new U.S.-Russia strategic arms limitation treaty, there is plenty of room for deeper reductions in these two arsenals, including tactical nuclear weapons, which have never been covered by a treaty, and strategic nuclear weapons held in reserve.

This December will mark the 20th anniversary of the Soviet collapse and end of the Cold War, a largely peaceful finale to an enormous, costly competition between two blocs and two colossal military machines. Today's threats are different: terrorism, cyber attacks, pandemics, proliferation and conventional wars. As Leon Panetta told the Senate Armed Services Committee at his confirmation hearing to be Secretary of Defense: "We are no longer in the Cold War. This is more like the blizzard war, a blizzard of challenges that draw speed and intensity from terrorism, from rapidly developing technologies and the rising number of powers on the world stage."

Yet the United States and Russia, no longer adversaries, seem to be sleepwalking toward the future. Perhaps the drift is the result of the approaching election season in both countries. Unfortunately, politics makes it harder to embrace new thinking. But honestly, haven't we learned anything in two decades?

Instead of moving to the next stage in reducing nuclear arsenals, the two countries are debating stale arguments of yesteryear.

Take missile defense. A generation ago, President Reagan proposed research into a global shield to defend against ballistic missiles. At the Reykjavik summit in 1986, Reagan and Soviet leader Mikhail Gorbachev came close to a deal that would have dramatically slashed offensive strategic nuclear arms. But it fell apart because Reagan insisted on his dream of a global missile defense shield. Even today, many Americans remember this dramatic moment as a triumph by Reagan. The globe-straddling shield was never built, although one legacy of that era is that missile defense still enjoys enormous political support in Congress. Many of the vexing technical hurdles to building an effective shield remain unresolved.

Today, a fresh divide over missile defense separates East and West. It should not be as momentous as the last one. NATO and Russia are discussing a U.S. plan to build a limited European ballistic missile defense system, known as the Phased Adaptive Approach, largely aimed at defending against medium-range missiles from Iran. The scope would be more modest than Reagan's 1983 idea. Nonetheless, Russian officials have expressed fear that improvements in the NATO system by the end of this decade could threaten Moscow's nuclear deterrent. Russia has asked NATO for legal guarantees that the system would not be used to neutralize its strategic missiles. In response, NATO has been trying to hammer out a method of cooperation—two hands on the joystick?—to meet the Russian concerns, so far without success.

The Russians have been warning that should this effort stall, it may not be possible to negotiate deeper cuts in existing nuclear arsenals. Also, partly in response to uncertainty over missile defense, Russia has taken the first steps to design a new liquid-fueled, multiple-warhead intercontinental ballistic missile. Such a project would take years, huge investments, and might never materialize, but it has appeared on the drawing boards.

These may be just negotiating feints. But it will be a real shame if an impasse over missile defense prevents progress on negotiations for deeper cuts in existing nuclear arsenals, or if it begets a new weapons system.

Last week, one of Russia's leading defense industry chiefs, Yuri Solomonov, who heads the Moscow Heat Technology Institute, which built the Topol-M and Bulava missiles, presented some hard truths in an interview published by the newspaper Kommersant. He called plans to build a new heavy liquid-fueled missile "outright stupidity." On missile defense, he said there has been talk about a shield for half a century; nothing has come of it, and nothing will come of it. He said ballistic missile defense would always be easier to defeat with countermeasures, which Russia has developed.

So, let's hope NATO and Russia can find a way to agree on limited missile defense, if only to pave the way for genuine cooperation on what's really important: reducing the existing outsized nuclear arsenals. Should arms control negotiations stall, and Russia builds the new heavy missile, it will stimulate a response in the United States, where the military services are already preparing modernization plans for the next generation of subs, missiles and aircraft to carry nuclear weapons. A new Russian heavy missile would be just the threat they need to justify massive new spending.

A revived nuclear arms race is the last thing the world needs to mark the 20th anniversary of the end of the Cold War.

David E. Hoffman is a Pulitzer Prize-winning author and a contributing editor to Foreign Policy.

Article 6.

The Guardian

Do humans have a role in the robot wars of the future?

Barbara Ehrenreich

11 July 2011 -- For a book about the all-too-human "passions of war", my 1997 work *Blood Rites* ended on a strangely inhuman note: I suggested that, whatever distinctly human qualities war calls upon – honour, courage, solidarity, cruelty, and so forth – it might be useful to stop thinking of war in exclusively human terms. After all, certain species of ants wage war and computers can simulate "wars" that play themselves out on-screen without any human involvement.

More generally, then, we should define war as a self-replicating pattern of activity that may or may not require human participation. In the human case, we know it is capable of spreading geographically and evolving rapidly over time – qualities that, as I suggested somewhat fancifully, make war a metaphorical successor to the predatory animals that shaped humans into fighters in the first place. A decade and a half later, these musings do not seem quite so airy and abstract anymore. The trend, at the close of the twentieth century, still seemed to be one of ever more massive human involvement in war – from armies containing tens of thousands in the sixteenth century, to hundreds of thousands in the nineteenth, and eventually millions in the twentieth-century world wars.

It was the ascending scale of war that originally called forth the existence of the nation-state as an administrative unit capable of maintaining mass armies and the infrastructure – for taxation, weapons manufacture, transport, etc – that they require. War has been, and we still expect it to be, the most massive collective project

human beings undertake. But it has been evolving quickly in a very different direction, one in which human beings have a much smaller role to play.

One factor driving this change has been the emergence of a new kind of enemy, so-called "non-state actors," meaning popular insurgencies and loose transnational networks of fighters, none of which are likely to field large numbers of troops or maintain expensive arsenals of their own. In the face of these new enemies, typified by al-Qaida, the mass armies of nation-states are highly ineffective, cumbersome to deploy, difficult to manoeuvre, and from a domestic point of view, overly dependent on a citizenry that is both willing and able to fight, or at least to have their children fight for them.

Yet just as US military cadets continue, in defiance of military reality, to sport swords on their dress uniforms, our leaders, both military and political, tend to cling to an idea of war as a vast, labour-intensive effort on the order of World War II. Only slowly, and with a reluctance bordering on the phobic, have the leaders of major states begun to grasp the fact that this approach to warfare may soon be obsolete.

Consider the most recent US war with Iraq. According to then-president George W Bush, the casus belli was the 9/11 terror attacks. The causal link between that event and our chosen enemy, Iraq, was, however, imperceptible to all but the most dedicated inside-the-Beltway intellectuals. Nineteen men had hijacked aeroplanes and flown them into the Pentagon and the World Trade Centre – 15 of them Saudi Arabians, none of them Iraqis – and we went to war against ... Iraq?

Military history offers no ready precedents for such wildly mis-aimed retaliation. The closest analogies come from anthropology, which provides plenty of cases of small-scale societies in which the death of

any member, for any reason, needs to be "avenged" by an attack on a more or less randomly chosen other tribe or hamlet.

Why Iraq? Neoconservative imperial ambitions have been invoked in explanation, as well as the American thirst for oil, or even an Oedipal contest between George W Bush and his father. There is no doubt some truth to all of these explanations, but the targeting of Iraq also represented a desperate and irrational response to what was, for Washington, an utterly confounding military situation.

We faced a state-less enemy – geographically diffuse, lacking uniforms and flags, invulnerable to invading infantries and saturation bombing, and apparently capable of regenerating itself at minimal expense. From the perspective of Secretary of Defense Donald Rumsfeld and his White House cronies, this would not do.

Since the US was accustomed to fighting other nation-states – geopolitical entities containing such identifiable targets as capital cities, airports, military bases, and munitions plants – we would have to find a nation-state to fight, or as Rumsfeld put it, a "target-rich environment". Iraq, pumped up by alleged stockpiles of "weapons of mass destruction" became the designated surrogate for an enemy that refused to play our game.

The effects of this atavistic war are still being tallied: in Iraq, we would have to include civilian deaths estimated at possibly hundreds of thousands, the destruction of civilian infrastructure, and devastating outbreaks of sectarian violence of a kind that, as we should have learned from the dissolution of Yugoslavia, can readily follow the death or removal of a nationalist dictator.

But the effects of war on the US and its allies may end up being almost as tragic. Instead of punishing the terrorists who had attacked the US, the war seems to have succeeded in recruiting more such irregular fighters, young men (and sometimes women) willing to die and ready to commit further acts of terror or revenge. By insisting on

fighting a more or less randomly selected nation-state, the US may only have multiplied the non-state threats it faces.

Unwieldy armies

Whatever they may think of what the US and its allies did in Iraq, many national leaders are beginning to acknowledge that conventional militaries are becoming, in a strictly military sense, almost ludicrously anachronistic. Not only are they unsuited to crushing counterinsurgencies and small bands of terrorists or irregular fighters, but mass armies are simply too cumbersome to deploy on short notice.

In military lingo, they are weighed down by their "tooth to tail" ratio – a measure of the number of actual fighters in comparison to the support personnel and equipment the fighters require. Both hawks and liberal interventionists may hanker to airlift tens of thousands of soldiers to distant places virtually overnight, but those soldiers will need to be preceded or accompanied by tents, canteens, trucks, medical equipment, and so forth. "Flyover" rights will have to be granted by neighbouring countries; air strips and eventually bases will have to be constructed; supply lines will have to be created and defended – all of which can take months to accomplish.

The sluggishness of the mass, labour-intensive military has become a constant source of frustration to civilian leaders. Irritated by the Pentagon's hesitation to put "boots on the ground" in Bosnia, then-Secretary of State Madeline Albright famously demanded of Secretary of Defense Colin Powell, "What good is this marvellous military force if we can never use it?" In 2009, the Obama administration unthinkingly proposed a troop surge in Afghanistan, followed by a withdrawal within a year and a half that would have required some of the troops to start packing up almost as soon as they arrived. It took the US military a full month to organize the transport of 20,000 soldiers to Haiti in the wake of the 2010 earthquake – and

they were only travelling 700 miles to engage in a humanitarian relief mission, not a war.

Another thing hobbling mass militaries is the increasing unwillingness of nations, especially the more democratic ones, to risk large numbers of casualties. It is no longer acceptable to drive men into battle at gunpoint or to demand that they fend for themselves on foreign soil. Once thousands of soldiers have been plunked down in a "theatre" they must be defended from potentially hostile locals, a project that can easily come to supersede the original mission.

We may not be able clearly to articulate what American troops were supposed to accomplish in Iraq or Afghanistan, but without question one part of their job has been "force protection". In what could be considered the inverse of "mission creep", instead of expanding, the mission now has a tendency to contract to the task of self-defence.

Ultimately, the mass militaries of the modern era, augmented by ever-more expensive weapons systems, place an unacceptable economic burden on the nation-states that support them – a burden that eventually may undermine the militaries themselves. Consider what has been happening to the world's sole military superpower, the United States. The latest estimate for the cost of the wars in Iraq and Afghanistan is, at this moment, at least \$3.2 trillion, while total US military spending equals that of the next 15 countries combined, and adds up to approximately 47% of all global military spending.

To this must be added the cost of caring for wounded and otherwise damaged veterans, which has been mounting precipitously as medical advances allow more of the injured to survive. The US military has been sheltered from the consequences of its own profligacy by a level of bipartisan political support that has kept it almost magically immune to budget cuts, even as the national debt balloons to levels widely judged to be unsustainable.

The hard right, in particular, has campaigned relentlessly against "big government", apparently not noticing that the military is a sizable chunk of this behemoth. In December 2010, for example, a Republican senator from Oklahoma railed against the national debt with this statement: "We're really at war. We're on three fronts now: Iraq, Afghanistan, and the financial tsunami [arising from the debt] that is facing us." Only in recent months have some Tea Party-affiliated legislators broken with tradition by declaring their willingness to cut military spending.

How the warfare state became the welfare state

If military spending is still for the most part sacrosanct, ever more spending cuts are required to shrink "big government". Then what remains is the cutting of domestic spending, especially social programmes for the poor, who lack the means to finance politicians, and all too often the incentive to vote as well. From the Reagan years on, the US government has chipped away at dozens of programmes that had helped sustain people who are underpaid or unemployed, including housing subsidies, state-supplied health insurance, public transportation, welfare for single parents, college tuition aid, and inner-city economic development projects.

Even the physical infrastructure – bridges, airports, roads, and tunnels – used by people of all classes has been left at dangerous levels of disrepair. Antiwar protestors wistfully point out, year after year, what the cost of our high-tech weapon systems, our global network of more than 1,000 military bases, and our various "interventions" could buy if applied to meeting domestic human needs. But to no effect.

This ongoing sacrifice of domestic welfare for military "readiness" represents the reversal of a historic trend. Ever since the introduction of mass armies in Europe in the seventeenth century, governments have generally understood that to underpay and underfeed one's

troops – and the class of people that supplies them – is to risk having the guns pointed in the opposite direction from that which the officers recommend.

In fact, modern welfare states, inadequate as they may be, are in no small part the product of war – that is, of governments' attempts to appease soldiers and their families. In the US, for example, the Civil War led to the institution of widows' benefits, which were the predecessor of welfare in its Aid to Families with Dependent Children form. It was the bellicose German leader Otto von Bismarck who first instituted national health insurance.

World War II spawned educational benefits and income support for American veterans and led, in the United Kingdom, to a comparatively generous welfare state, including free health care for all. Notions of social justice and fairness, or at least the fear of working class insurrections, certainly played a part in the development of twentieth century welfare states, but there was a pragmatic military motivation as well: if young people are to grow up to be effective troops, they need to be healthy, well-nourished, and reasonably well-educated.

In the US, the steady withering of social programmes that might nurture future troops even serves, ironically, to justify increased military spending. In the absence of a federal jobs programme, Congressional representatives become fierce advocates for weapons systems that the Pentagon itself has no use for, as long as the manufacture of those weapons can provide employment for some of their constituents.

With diminishing funds for higher education, military service becomes a less dismal alternative for young working-class people than the low-paid jobs that otherwise await them. The US still has a civilian welfare state consisting largely of programmes for the elderly (Medicare and Social Security). For many younger Americans,

however, as well as for older combat veterans, the US military is the welfare state – and a source, however temporarily, of jobs, housing, health care and education.

Eventually, however, the failure to invest in America's human resources – through spending on health, education, and so forth – undercuts the military itself. In World War I, public health experts were shocked to find that one-third of conscripts were rejected as physically unfit for service; they were too weak and flabby or too damaged by work-related accidents.

Several generations later, in 2010, the US Secretary of Education reported that "75 percent of young Americans, between the ages of 17 to 24, are unable to enlist in the military today because they have failed to graduate from high school, have a criminal record, or are physically unfit." When a nation can no longer generate enough young people who are fit for military service, that nation has two choices: it can, as a number of prominent retired generals are currently advocating, reinvest in its "human capital", especially the health and education of the poor, or it can seriously reevaluate its approach to war.

The fog of (robot) war

Since the rightward, anti-"big government" tilt of American politics more or less precludes the former, the US has been scrambling to develop less labour-intensive forms of waging war. In fact, this may prove to be the ultimate military utility of the wars in Iraq and Afghanistan: if they have gained the US no geopolitical advantage, they have certainly served as laboratories and testing grounds for forms of future warfare that involve less human, or at least less governmental, commitment.

One step in that direction has been the large-scale use of military contract workers supplied by private companies, which can be seen as a revival of the age-old use of mercenaries. Although most of the

functions that have been outsourced to private companies – including food services, laundry, truck driving, and construction – do not involve combat, they are dangerous, and some contract workers have even been assigned to the guarding of convoys and military bases. Contractors are still men and women, capable of bleeding and dying – and surprising numbers of them have indeed died. In the initial six months of 2010, corporate deaths exceeded military deaths in Iraq and Afghanistan for the first time. But the Pentagon has little or no responsibility for the training, feeding, or care of private contractors. If wounded or psychologically damaged, American contract workers must turn, like any other injured civilian employees, to the Workers' Compensation system, hence their sense of themselves as a "disposable army". By 2009, the trend toward privatisation had gone so far that the number of private contractors in Afghanistan exceeded the number of American troops there.

An alternative approach is to eliminate or drastically reduce the military's dependence on human beings of any kind. This would have been an almost unthinkable proposition a few decades ago, but technologies employed in Iraq and Afghanistan have steadily stripped away the human role in war. Drones, directed from sites up to 7,500 miles away in the western United States, are replacing manned aircraft.

Video cameras, borne by drones, substitute for human scouts or information gathered by pilots. Robots disarm roadside bombs. When American forces invaded Iraq in 2003, no robots accompanied them; by 2008, there were 12,000 participating in the war. Only a handful of drones were used in the initial invasion; today, the US military has an inventory of more than 7,000, ranging from the familiar Predator to tiny Ravens and Wasps used to transmit video images of events on the ground. Far stranger fighting machines are in the works, like

swarms of lethal "cyborg insects" that could potentially replace human infantry.

These developments are by no means limited to the US. The global market for military robotics and unmanned military vehicles is growing fast, and includes Israel, a major pioneer in the field, Russia, the United Kingdom, Iran, South Korea, and China. Turkey is reportedly readying a robot force for strikes against Kurdish insurgents; Israel hopes to eventually patrol the Gaza border with "see-shoot" robots that will destroy people perceived as transgressors as soon as they are detected.

It is hard to predict how far the automation of war and the substitution of autonomous robots for human fighters will go. On the one hand, humans still have the advantage of superior visual discrimination. Despite decades of research in artificial intelligence, computers cannot make the kind of simple distinctions – as in determining whether a cow standing in front of a barn is a separate entity or a part of the barn – that humans can make in a fraction of a second.

Thus, as long as there is any premium on avoiding civilian deaths, humans have to be involved in processing the visual information that leads, for example, to the selection of targets for drone attacks. If only as the equivalent of seeing-eye dogs, humans will continue to have a role in war, at least until computer vision improves.

On the other hand, the human brain lacks the bandwidth to process all the data flowing into it, especially as new technologies multiply that data. In the clash of traditional mass armies, under a hail of arrows or artillery shells, human warriors often found themselves confused and overwhelmed, a condition attributed to "the fog of war". Well, that fog is growing a lot thicker. US military officials, for instance, put the blame on "information overload" for the killing of

23 Afghan civilians in February 2010, and the New York Times reported that:

"Across the military, the data flow has surged; since the attacks of 9/11, the amount of intelligence gathered by remotely piloted drones and other surveillance technologies has risen 1,600 percent. On the ground, troops increasingly use hand-held devices to communicate, get directions and set bombing coordinates. And the screens in jets can be so packed with data that some pilots call them 'drool buckets' because, they say, they can get lost staring into them."

When the sensory data coming at a soldier is augmented by a flood of instantaneously transmitted data from distant cameras and computer search engines, there may be no choice but to replace the sloppy "wet-ware" of the human brain with a robotic system for instant response.

War without humans

Once set in place, the cyber-automation of war is hard to stop.

Humans will cling to their place "in the loop" as long as they can, no doubt insisting that the highest level of decision-making – whether to go to war and with whom – be reserved for human leaders. But it is precisely at the highest levels that decision-making may most need automating. A head of state faces a blizzard of factors to consider, everything from historical analogies and satellite-derived intelligence to assessments of the readiness of potential allies. Furthermore, as the enemy automates its military, or in the case of a non-state actor, simply adapts to our level of automation, the window of time for effective responses will grow steadily narrower. Why not turn to a high-speed computer? It is certainly hard to imagine a piece of intelligent hardware deciding to respond to the 9/11 attacks by invading Iraq.

So, after at least 10,000 years of intra-species fighting – of scorched earth, burned villages, razed cities, and piled up corpses, as well, of course, as all the great epics of human literature – we have to face the

possibility that the institution of war might no longer need us for its perpetuation. Human desires, especially for the Earth's diminishing supply of resources, will still instigate wars for some time to come, but neither human courage nor human bloodlust will carry the day on the battlefield.

Computers will assess threats and calibrate responses; drones will pinpoint enemies; robots might roll into the streets of hostile cities. Beyond the individual battle or smaller-scale encounter, decisions as to whether to match attack with counterattack, or one lethal technological innovation with another, may also be eventually ceded to alien minds.

This should not come as a complete surprise. Just as war has shaped human social institutions for millennia, so has it discarded them as the evolving technology of war rendered them useless. When war was fought with blades by men on horseback, it favoured the rule of aristocratic warrior elites. When the mode of fighting shifted to action-at-a-distance weapons like bows and guns, the old elites had to bow to the central authority of kings, who, in turn, were undone by the democratizing forces unleashed by new mass armies.

Even patriarchy cannot depend on war for its long-term survival, since the wars in Iraq and Afghanistan have, at least within US forces, established women's worth as warriors. Over the centuries, human qualities once deemed indispensable to war fighting – muscular power, manliness, intelligence, judgment – have one by one become obsolete or been ceded to machines.

What will happen then to the "passions of war"? Except for individual acts of martyrdom, war is likely to lose its glory and lustre. Military analyst PW Singer quotes an Air Force captain musing about whether the new technologies will "mean that brave men and women will no longer face death in combat," only to reassure himself that

"there will always be a need for intrepid souls to fling their bodies across the sky".

Perhaps, but in a 2010 address to Air Force Academy cadets, an under secretary of defense delivered the "bad news" that most of them would not be flying aeroplanes, which are increasingly unmanned. War will continue to be used against insurgencies as well as to "take out" the weapons facilities, command centres, and cities of designated rogue states. It may even continue to fascinate its aficionados, in the manner of computer games. But there will be no triumphal parades for killer nano-bugs, no epics about unmanned fighter planes, no monuments to fallen bots.

And in that may lie our last hope. With the decline of mass militaries and their possible replacement by machines, we may finally see that war is not just an extension of our needs and passions, however base or noble. Nor is it likely to be even a useful test of our courage, fitness, or national unity. War has its own dynamic or – in case that sounds too anthropomorphic – its own grim algorithms to work out. As it comes to need us less, maybe we will finally see that we don't need it either. We can leave it to the ants.

Barbara Ehrenreich is the author of several books, including Smile Or Die: How Positive Thinking Fooled America and the World; Nickel and Dimed: On (Not) Getting By in America; and Blood Rites: Origins and History of the Passions of War.

Article 7.

NYT

In Search of a Robot More Like Us

John Markoff

July 11, 2011 -- The robotics pioneer Rodney Brooks often begins speeches by reaching into his pocket, fiddling with some loose change, finding a quarter, pulling it out and twirling it in his fingers. The task requires hardly any thought. But as Dr. Brooks points out, training a robot to do it is a vastly harder problem for artificial intelligence researchers than I.B.M.'s celebrated victory on "Jeopardy!" this year with a robot named Watson.

Although robots have made great strides in manufacturing, where tasks are repetitive, they are still no match for humans, who can grasp things and move about effortlessly in the physical world.

Designing a robot to mimic the basic capabilities of motion and perception would be revolutionary, researchers say, with applications stretching from care for the elderly to returning overseas manufacturing operations to the United States (albeit with fewer workers).

Yet the challenges remain immense, far higher than artificial intelligence hurdles like speaking and hearing.

"All these problems where you want to duplicate something biology does, such as perception, touch, planning or grasping, turn out to be hard in fundamental ways," said Gary Bradski, a vision specialist at Willow Garage, a robot development company based here in Silicon Valley.

"It's always surprising, because humans can do so much effortlessly." Now the Defense Advanced Research Projects Agency, or Darpa, the Pentagon office that helped jump-start the first generation of artificial intelligence research in the 1960s, is underwriting three competing

efforts to develop robotic arms and hands one-tenth as expensive as today's systems, which often cost \$100,000 or more.

Last month President Obama traveled to Carnegie Mellon University in Pittsburgh to unveil a \$500 million effort to create advanced robotic technologies needed to help bring manufacturing back to the United States. But lower-cost computer-controlled mechanical arms and hands are only the first step.

There is still significant debate about how even to begin to design a machine that might be flexible enough to do many of the things humans do: fold laundry, cook or wash dishes. That will require a breakthrough in software that mimics perception.

Today's robots can often do one such task in limited circumstances, but researchers describe their skills as "brittle." They fail if the tiniest change is introduced. Moreover, they must be reprogrammed in a cumbersome fashion to do something else.

Many robotics researchers are pursuing a bottom-up approach, hoping that by training robots on one task at a time, they can build a library of tasks that will ultimately make it possible for robots to begin to mimic humans.

Others are skeptical, saying that truly useful machines await an artificial intelligence breakthrough that yields vastly more flexible perception.

The limits of today's most sophisticated robots can be seen in a towel-folding demonstration that a group of students at the University of California, Berkeley, posted on the Internet last year: In spooky, anthropomorphic fashion, a robot deftly folds a series of towels, eyeing the corners, smoothing out wrinkles and neatly stacking them in a pile.

It is only when the viewer learns that the video is shown at 50 times normal speed that the meager extent of the robot's capabilities becomes apparent. (The students acknowledged this spring that they

were only now beginning to tackle the further challenges of folding shirts and socks.)

Even the most ambitious and expensive robot arm research has not yet yielded impressive results.

In February, for example, Robonaut 2, a dexterous robot developed in a partnership between NASA and General Motors, was carried aboard a space shuttle mission to be installed on the International Space Station. The developers acknowledged that the software required by the system, which is humanoid-shaped from the torso up, was unfinished and that the robot was sent up then only because a rare launching window was available.

“We’re in a funny chicken-and-egg situation,” Dr. Brooks said. “No one really knows what sensors or perceptual algorithms to use because we don’t have a working hand, and because we don’t have a grasping strategy nobody can figure out what kind of hand to design.” Dr. Brooks is also tackling the problem: In 2008 he founded Heartland Robotics, a Boston-based company that is intent on building a generation of low-cost robots.

And the three competing efforts to develop robotic arms and hands with Darpa financing — at SRI International, Sandia National Laboratories and iRobot — offer some reasons for optimism.

Recently at an SRI laboratory here, two Stanford University graduate students, John Ulmen and Dan Aukes, put the finishing touches on a significant step toward human capabilities: a four-finger hand that will grasp with a human’s precise sense of touch.

Each three-jointed finger is made in a single manufacturing step by a three-dimensional printer and is then covered with “skin” derived from the same material used to make the touch-sensitive displays on smartphones.

“Part of what we’re riding on is there has been a very strong push for tactile displays because of smartphones,” said Pablo Garcia, an SRI

robot designer who is leading the design of the project, along with Robert Bolles, an artificial intelligence researcher.

“We’ve taken advantage of these technologies,” Mr. Garcia went on, “and we’re banking on the fact they will continue to evolve and be made even cheaper.”

Still lacking is a generation of software that is powerful and flexible enough to do tasks that humans do effortlessly. That will require a breakthrough in machines’ perception.

“I would say this is more difficult than what the Watson machine had to do,” said Gill Pratt, the computer scientist who is the program manager in charge of Darpa’s Autonomous Robot Manipulation project, called ARM.

“The world is composed of continuous objects that have various shapes” that can obscure one another, he said. “A perception system needs to figure this out, and it needs the common sense of a child to do that.”

At Willow Garage, Dr. Bradski and a group of artificial intelligence researchers and roboticists have focused on “hackathons,” in which the company’s PR2 robot has been programmed to do tasks like fetching beer from a refrigerator, playing pool and packing groceries. In May, with support from the White House Office of Science and Technology Policy, Dr. Bradski helped organize the first Solutions in Perception Challenge. A prize of \$10,000 is offered for the first team to design a robot that is able to recognize 100 items commonly found on the shelves of supermarkets and drugstores. Part of the prize will be given to the first team whose robot can recognize 80 percent of the items.

At the contest, held during a robotics conference in Shanghai, none of the contestants reached the 80 percent goal. The team that did best was the laundry-folding team from Berkeley, which has named its robot Brett, for Berkeley Robot for the Elimination of Tedious Tasks.

Brett was able to recognize 68 percent of a smaller group of 50 objects. And the team has made progress in its quest to build a machine to do the laundry; it recently posted a new video showing how much it has sped up the robot.

“Our end goal right now is to do an entire laundry cycle,” said Pieter Abbeel, a Berkeley computer scientist who leads the group, “from dirty laundry in a basket to everything stacked away after it’s been washed and dried.”