

# CALLBACK

From NASA's Aviation Safety Reporting System



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## MANAGING MUSCLE MEMORY

Muscle memory is an interesting physiological phenomenon involving our muscles and their interaction with the brain. The more often we perform a given physical action, the more likely we are to do it as needed, when needed, without having to think about the specific combination of movements involved. These habits thus become an unconscious process that occurs when triggered by a given circumstance or set of cues.

Practicing a procedure until the process is automatic develops muscle memory that can be crucial when an immediate action emergency (such as an engine failure at V1) occurs. However, as in the incident reports below, muscle memory can be a problem when the cues are right, but the circumstances are wrong. That is when the brain has to be “conscious” enough to stop the automatic response of well-trained muscles.

The following ASRS reports recount a sequence of ground incidents in which muscle memory took over at the wrong time.

### TAXI OUT, TOW BACK

Faced with a distraction and a familiar set of circumstances, a B737 Captain let muscle memory take over just long enough to create an embarrassing situation.

■ *Inoperative APU; second flight of the day; started the number one engine at the gate...; asked for taxi to a remote area for cross-bleed start of the number two engine. Stopping at the designated location, the aircraft began to shimmy slightly under braking. I stopped braking then applied brakes again. The shimmy did not happen again so I set the parking brake. I then grabbed the number one engine start lever and began to shut the number one engine down. Realizing what I was doing, I quickly returned it to the previous position, but the engine had already shut down. We were now on battery power. I told the Flight Attendants to remain seated, then told ATC we would need a tow back to the gate and we had one radio and would need to go off frequency to coordinate with Company Operations. We turned IRS 1 and 2 off and tried to explain to the passengers what had happened. We were back at the gate in approximately 10 minutes. We started the engine and did the procedure properly the second time. The remainder of the flight was uneventful.*

*I guess I would say it was muscle memory, the same motion as arriving at a gate, number two engine shut down, parking brake set. I should be more deliberate in all of my actions, but it happened so fast that the First Officer did not even have time to react. The brake shimmy was a distraction, but that does not excuse me from my action.*

### A BAD MATCH UP

This B737 Captain's method of checking the start lever position was problem enough, but then muscle memory kicked in and made the situation worse.

■ *It was my leg. Preflight activities had been normal and we were not rushed at all... We had been instructed to hold short of [the runway] and were almost stopped. I had already called for the Before Takeoff Checklist and the First Officer challenged me with “Start Levers” at the next to last step in that checklist. I reached down to confirm “Idle.” My practice has been to hold the start levers with my thumb and forefinger, confirm the idle detent position with a slight nudge forward and a slight nudge rearward, then to respond, “Idle.” However this time with the slight nudge to the rear, the number one start lever felt like it was not quite fully down in the idle detent. It came up over the edge and I unintentionally shut down the number one engine. I was surprised and stunned.*

*I announced the situation to the First Officer and set the parking brake. Then instinctively I reached down again to confirm the start lever positions. At that point muscle memory kicked in and I must have “matched” the start lever heights. To my horror, when I nudged the levers rearward again, I unintentionally shut down the number two engine as well. I started the APU and put electrical power back on the aircraft. We told ATC that we had a problem and that it would be a few minutes before we could move. Feeling completely inept and embarrassed, I told the First Officer that we would start over and re-accomplish everything beginning with the Before Start Checklist. The First Officer agreed.*

*I made a short and embarrassing announcement to the Passengers and apologized for the delay while we dealt with a cockpit issue. We then flew an otherwise uneventful flight.*

Several suggestions come to mind in order to prevent this from happening again. Primarily, I have changed the way that I check the start levers in the idle detent. No longer will I hold them with my thumb and forefinger. And no longer will I nudge them rearward, but only forward and down.

## HOUSTON, WE HAVE “AN ISSUE”

A B737-800 Captain’s prescription for inhibiting muscle memory involves slowing down and thinking before a particular situation triggers your internal automation and results in a dose of humility.

■ *We were told to line up and wait. I brought the aircraft to a stop and, for some strange reason, I reached over and shut down both engines instead of setting the parking brake. We told Tower that we had an “issue” and would be in place for a minute or two and then we would have to taxi clear. We started the right engine and taxied clear of the runway so we could redo checklists and regroup. When the Tower later asked what our issue was, I think we told them that we had to look at a light. Actually, lots of lights.*

*With the start levers being right next to the parking brake, I guess that once my hand was on the start levers, positioned right next to the parking brake, muscle memory took over and moved them to off. I need to slow down and think about what I am doing before moving any switch or lever. This was definitely the healthiest dose of humility ever in my many years of flying.*

## THE BEST LAID PLANS...

Even when the need for a non-standard sequence of events is recognized and planned for in advance, strong muscle memory concerning the standard sequence can prevail. This CRJ200 First Officer confirms that slowing down is the best way to engage the brain and disengage muscle memory.

■ *When we received the aircraft, the previous crew had written up the #2 AC Generator. Maintenance came and deferred the generator. Per the MEL operations instructions, we were to keep the APU running for the entire flight. The Captain and I discussed this as part of our pre-departure briefing. When Tower cleared us to line up and wait, I ran the Takeoff Checklist and turned off the APU out of habit. I realized my mistake and informed the Captain. We notified the Tower that we would need to exit the runway and get back in line to restart the APU.*

*This incident illustrates why it is important to slow down when completing checklists and flows during abnormal operations to ensure they are completed properly. I shutdown the APU due to “muscle memory” during the Takeoff Checklist even*

*though we had discussed the MEL procedures for the deferred AC Generator during the pre-departure briefing.*

## ROLLING IN THE SNOW

A CRJ900 Captain, faced with an oncoming snow plow, went for the brakes and engine reverse, but muscle memory had other ideas.

■ *After landing, we were taxiing to our gate. The taxiways were snow covered with fair braking action. We had shut down our right engine and left the APU shut down. A snow plow was on our right and just ahead of us. I was watching him when he abruptly started to turn left into us. I applied the brakes, with minimal effectiveness, and I was going to apply reverse thrust, but muscle memory kicked in and I mistakenly shut down the left engine. We lost all power and rolled to a stop. The plow never completed his turn, but saw us and turned away. We informed ATC and started the APU to restart an engine. Within two minutes the engine was running again and we taxied to the gate without incident.*

## ARMED AND DANGEROUS

An A320 First Officer got a first-hand lesson in how a busy, rushed environment can cause muscle memory to override a more methodical thought process.

■ *This incident started about 5-10 minutes after the last passenger deplaned. Doors 1L and 2L were both open. There were many cleaners on the aircraft from the front to the back. The situation was busy at best, frantic at worst. I was standing on the front air stairs when a Flight Attendant asked me if I could supervise the opening of Door 2R. The cleaners were beating on the door to have it opened so that the trash could be emptied. I agreed to supervise since no other crewmembers were available. I followed the Flight Attendant to the back of the airplane where various ramp personnel were in the aft galley conducting their work. The Flight Attendant proceeded to arm the door as it had been disarmed from deplaning. It was at this point that I became confused. Before I could intervene, the Flight Attendant pulled up on the handle. The door opened and the slide blew. Luckily, no one was injured.*

*I should have done a better job confirming what was actually going on and tried to slow the process down. ... The overall issue for me was being distracted, rushed and uncertain of my supervision objective. I also believe the Flight Attendant was trying to do the right thing, especially as a new employee. She was rushed and getting pressure from the cleaners. In retrospect, I think she was operating on muscle memory. Since she had already disarmed the door, the next event was to arm it.*

ASRS Alerts Issued in 2015	
Subject of Alert	No. of Alerts
Airport Facility or Procedure	54
Aircraft or Aircraft Equipment	53
ATC Equipment or Procedure	33
Hazard to Flight	6
Other	3
Company Policy	2
Maintenance Procedure	1
<b>TOTAL</b>	<b>152</b>

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January 2016 Report Intake	
Air Carrier/Air Taxi Pilots	4,214
General Aviation Pilots	867
Flight Attendants	512
Controllers	356
Military/Other	317
Dispatchers	172
Mechanics	156
<b>TOTAL</b>	<b>6,594</b>